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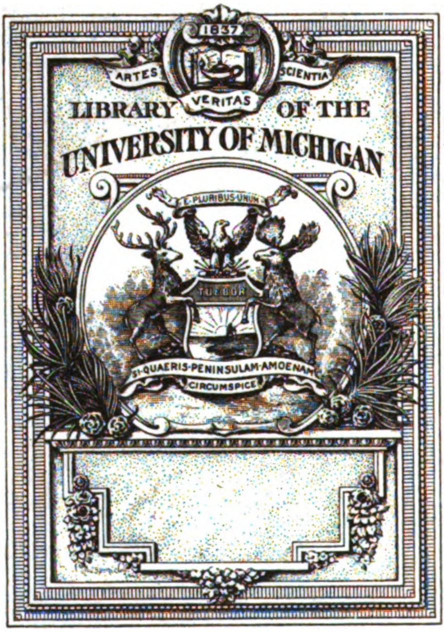
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THE JOURNAL

OF

COMPARATIVE MEDICINE AND SURGERY,

A QUARTERLY JOURNAL

OF THE

ANATOMY, PATHOLOGY AND THERAPEUTICS OF THE LOWER ANIMALS.

W. A. CONKLIN, Ph.D. } *Editors.*
F. S. BILLINGS, D.V.S. }

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ORIGINAL COMMUNICATIONS.

Art. I.—INTRODUCTORY ADDRESS.*

BY RUSH SHIPPEN HUIDEKOPER, M.D., V.S.
Dean of the Veterinary Faculty, University of Pennsylvania.

Mr. Provost and Gentlemen:

I have, to-day, the honor to deliver the first address of this new Department of the University of Pennsylvania for the instruction of Veterinary Medicine.

I feel that I have a right to the pleasure and pride I take in the position which you have awarded me, as a Pennsylvanian, an alumnus of this University, and as a member of the family of the founder of its medical department which, for one hundred and nineteen years, has stood at the head of medical teaching in the United States; but I am awed by the responsibility which it places upon me. At the founding of the medical department the country was new; and any advance given to the people for their education was a boon which they welcomed, no matter how small it was. The physician and surgeon were so needed that they rose rapidly to a position which was socially better than it had been in the Mother country; every addition to the ranks of medicine was regarded as a public benefaction, for life is always man's greatest care.

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* Address delivered at the opening of the Veterinary Department, University of Pennsylvania, October 2d, 1884.

In founding a Veterinary school, we have much labor to perform. While a few people fortunately look upon the philanthropic side of Veterinary medicine, the majority only employ a Veterinary surgeon as a means of saving or of utilizing so many dollars and cents in the form of a domestic animal. Popular prejudice has classed the "Horse Doctor" and the "Cow Leech" with the most ignorant farrier, and has tainted him with the reputation for dishonesty of the proverbial horse dealer; medical men have classed him with the least educated empiric of their own cast, and, with the exception of a few individuals, no one has thought for a moment that the responsibility of the average ignorance was upon himself and his government.

Happily there are always men enterprising beyond their fellows, and throughout the country are many practitioners who have had the diligence to labor and the intelligence to appreciate what their experience has shown them: the want of journals and the small demand for, and high price of Veterinary books, except of the "Universal Stock Book and Veterinary Compendium" order, has prevented these men from being known outside of their own locality. Medical publishers hesitate to print the work of a Veterinary Surgeon unless it is of unexceptionable merit, and books of technical worth are only bought by the few physicians whose personal tastes interest them in animals as a pastime or for laboratory research; books which are within the scope of the layman's understanding are of little accuracy and value and are apt to condemn the author in the eyes of the scientific man.

In establishing an institution for the advancement of Veterinary knowledge, and in asking intelligent and reputable men to select it for a profession whereby they may gain a reputation and livelihood, we have to contend with the prejudice which ignorance has attached to Veterinary Surgeons as a class, and with the reluctance which the aspirants for this title feel, in offering to devote a long period of hard work to gain that which their neighbor, the farrier, acquired the day he opened a suppurating corn in a lame horse and sent it home sound, or the cow-leech took to himself when he gave some chance herb to a cow down with milk fever and she recovered, as they sometimes do, with the aid of nature. Before entering upon the causes which led to the foundation of this department of the University and its aims for the future, I will give a short review of the development of Veterinary Medicine in other countries and in our own.

VETERINARY MEDICINE

derives its name from the Latin "*Veterinarium,*" "*Veterinaria,*" Veterinary Medicine, "*Veterinarius,*" a Veterinary Surgeon, are terms coming from the "*Veterinae*" or "*Veheterinae,*" the general term used by the Romans for beasts of burden or pack animals, from "*vehere,*" to carry. Lenglet, however, claims that the term is of much older and of Celtic origin, being derived from "*vee,*" or "*vieh,*" cattle, and the verb "*teeren,*" to be sick. Nearly all languages employ words from this same root; French, "*Veterinaire,*" Italian, "*Veterinaria,*" South Germany, Hungarian and Russian, "*Veterinär,*" but in North Germany "*Thierarzt*" and "*Thier-medicin*" (animal doctor and animal medicine) are more generally used.

Veterinary Medicine comprises not only the study of Anatomy, Physiology, Chemistry, Materia Medica and diseases in their relationship to animals, but includes with equal importance the laws of breeding animals, and of raising and training them to be of greatest service to man, whether as motors or as machines for the production of milk, food and clothing; these uses in turn necessitate a knowledge of farriery and the inspection of meat when used as food.

The earliest references to the diseases of animals are found contemporaneously with the first medical writings. Æsculapius in mythological history includes a knowledge of horses, which he derived from Chiron, the Centaur. Hippocrates (460-377 B. C.) described the symptoms of diseases and the remedies to be used in animals. Zend Avesta, the Arab, and Charaka, the Hindoo, mention several of their maladies. Ebers shows that dissection was carried on during the earliest Egyptian dynasties, and probably much more frequently in animals than in man on account of the rigid, religious rules in regard to the dead. The Egyptians had as many specialties as a medical school of to-day, and distinct mention is made of doctors for fowls. Numerous references are made in the Bible to diseases of animals, and to herbs used in curing their troubles, and in the Mosaic laws we have clear orders for the inspection of meat and the division of animals into the pure and the impure. Diocles (360 B. C.) derived most of his knowledge of Anatomy from animals, and Xenophon (445 B. C.), in his treatise on cavalry, describes some of the ailments of horses and especially speaks of founder. Aristotle (384-322 B. C.) wrote a work of some size on animal medicine which has been translated with great care by Doctors Aubert and Wimmer. Pamphylus of Alexandria (200 B. C.), Florentius, and Magon of Carthage at about the same date wrote works which were complete for the time; the latter was translated by Dionysius of Utica.

In early times the practice of animal medicine was almost exclusively confined to the shepherds and farriers, who rarely raised themselves above the common ignorance of the day. The surgical operations were limited to castration of the males of all species, and to the castration of female swine, which was also done by the earliest nomad races, and at the beginning of the Christian era was a well-known operation in Italy and Gaul. In the prime of the Grecian rule of the world, we find accounts of doctors for horses, who had, however, but a summary knowledge of diseases and blemishes, but who kept in accord with the spirit of the age in proposing great numbers and varieties of curative medicines. The writings of these men, composed almost entirely of letters, were collected in the tenth century by order of the Greek emperor, Constantine Porphyrogennetors, and were printed in the sixteenth century in both Greek and Latin text. The Roman emperors employed Veterinary surgeons in their armies, and the Emperor Augustus ordered the erection of hospitals for sick animals styled "Veterinarium" in contradistinction to the Valetudinarium or hospital for sick soldiers. The Roman writers on agriculture described numerous diseases of cattle, sheep, goats and swine, but their works are only of historical interest. Cato (234-149 B. C.), Varro (116 B. C.), in his *De re Rustica,* and Celsus (40 B. C.), are full of the superstitions of the age, and ascribe to the stars, to the moon and the various natural phenomena the greatest influence on diseases of animals and the remedies to be used in healing them. Columella (40 A. D.), in volumes six and seven of his twelve volumes "*De re Rustica,*" treats extensively of animals. He recommends bleeding, describes castration and the use of the hot iron, and splints for fracture. Pedanius Dioscoridius, twenty years later, gives an account of hydrophobia. Pliny, the younger, and Galen speak of the scab in sheep. In the middle of the fourth century Apsyrtus established the diagnosis of strangles from glanders, gave a description of moon blindness, founder, tetanus, cough, tuberculosis and several of the contagious diseases, and he proposed curative means of extreme common sense. At the latter end of the same century Vegetius Renatus, a Latin, collected most of the known writings of his predecessors, and compiled a work of Veterinary Medicine. From the seventh to the thirteenth centuries we find scarcely a trace of literature on veterinary subjects except from the pens of Abu Bekr, Avicenna (980-1037 A. D.), and Ibu el Beilhar (1248 A. D.); all of them Arabs. Then as now among the Arabs the art of healing a horse was regarded as a gift of God, belonging to special families and transmitted by them to their descendants. To offer them pay would be an insult, and their only reward is the most profuse hospitality from their neighbors.

During the early days of the Middle Ages the rulers of States were with a few exceptions too much occupied with wars to devote any thought to the advancement of science or to the promotion of agriculture. Under Frederick II., however, Jordanus Ruffus (1194 to 1250 A. D.) wrote a book of considerable value, in which spavin is described among other blemishes with great credit. In 1270 Theodoric, Bishop of Cervia, also wrote a book of value. The superstition of the Greek and Roman days, which perverted the symptoms of diseases and rendered all study of a rational nature futile, was in the Middle Ages replaced by a superstition more deleterious still to the advancement of any knowledge of animal diseases. The epidemics of the contagious diseases were considered a visitation and punishment of God, and it was thought improper to treat such sick beasts or to dissect their dead bodies. During the fifteenth century a school of cavalry was established in Naples and from it developed men with considerable veterinary attainments. Carraccioli, Grisone and others have left us books in great numbers.

The sixteenth century is the real commencement of a practical Veterinary era. At this time the wars of Europe were at perfection, the warriors had learned to protect their horses with heavy armor and required good horses to carry it; the gentler amusement of tournaments was indulged in alike by warriors and the secular and ecclesiastical princes and nobles, and required horses of spirit and speed to satisfy their ambition; hawking, other sports and the advancing refinement of civilization, which brought ladies, priests, scientific men and the artist followers in the amusements and travels of the courts, demanded palfreys and hinnies for their use. All this led to the breeding of better animals and produced numerous writers concerning the raising and care of the horse; his diseases and blemishes, the mode of curing them and equitation. The breeds of horses at this period in Italy had attained such a reputation that popes, cardinals, princes and all the greater nobles had their special brands and marks, and most of the books contained cuts of them with a description of the peculiar merits of the animals.

In 1590 the Senator Carlo Ruini, of Bologna, a celebrated teacher of medicine in several of the North Italian Universities, published a large and valuable work in folio on the anatomy and blemishes of the horse. He founded in the University at Bologna the first, and to-day the greatest, veterinary museum in the world. In the seventeenth and eighteenth centuries horses had acquired a relatively high value, and the numerous works which appeared on Hippology contained additional chapters on the diseases of the animals. Some attention was, at this, the so-called "stable-master's period," paid to dogs, hawks and other sporting animals; officers of the army and officials of the breeding studs were obliged to apply themselves to the cure of their ailments. In the eighteenth century the Rinderpest ravaged over the most of Europe; princes and governments commissioned the celebrities in medicine of the day to search for a remedy for the treatment or prevention of this pernicious disease. Several of the governments recognized the necessity for institutions for veterinary studies, but the jealousies of the stud masters on one hand and the military and epidemic authorities on the other, prevented the accomplishment of any definite plan.

In 1762, Claude Bourgelat, a French advocate, who was a lover of horses and as an amateur had attained considerable knowledge of animals and of medicine, placed the fruits of his labor and his extraordinary intellect to use. He founded from his own resources, which were limited, a school for teaching Veterinary medicine, at Lyons, in the centre of France; the only qualification demanded from scholars was a good character; the course extended over one year and treated principally of the horse. The success and fame of this school was immediate and great; not only were a large number of French scholars attracted to it, but most of the neighboring governments sent students to learn the merits of it. The French Government, which has always been the foster mother of science, now assumed the responsibility of the institution, enlarged it, and in 1765 called Bourgelat to Paris to establish a second school. This was placed at Alfort, on the site of the Royal Menagerie, and special attention was paid to cattle and sheep. There was at this time in Paris a private school rich in the teaching of Lafosse, the younger, but from unfortunate personal and political differences between Lafosse and Bourgelat no fusion of their teaching could ever be accomplished.

While Austria, Prussia and the greater German States, England, Denmark and Italy, resolved at once to profit by the example of France, the realization of their plans differed greatly and was not everywhere immediately completed. Italy and the Teuton races were the first to follow with success; their institutions were started under two distinct plans; one the founding of a complete Veterinary faculty, the other the addition of a single Veterinary chair to the existing Universities.

The University plan suffered from being unable to furnish sufficient clinical material, enough instruction in anatomy, and because the teaching was allied too closely to that of human medicine, too little practical instruction being given in the elementary parts of proper veterinary training and in the study of animal epidemics.

The coeducation of veterinary and medical students was strongly urged in a memoir of Cothenius, the body physician of Frederick the Great; he also argued that medical students should have a knowledge of animal epidemics so that they might afterwards officiate as Veterinary Inspectors. The first veterinary school to follow those in France was at Turin, in Piedmont, under Charles Emanuel III, King of Sardinia, in 1769; that at Copenhagen, Denmark, was founded in 1773 with Abildgaard in charge.

In Vienna, Austria, an advanced farrier's school, where a few operations were performed, existed from 1767 to 1777; Vienna had long been renowned for its guild of farriers, of whom a monument stands to-day in the Graben in the form of a tree stump converted into a column of iron by the horse-shoe nails which each smith drove into it on becoming a member of the guild. In 1764 the Empress Maria Theresa sent a soldier named Scotti, an apothecary named Mengman, and a certain Haller, to Lyons, for two years, who upon their return gave a limited course of instruction with success. In 1769 the Empress sent a surgeon named Wolstein accompanied by a smith to Alfort, where they remained two years, taking advantage also of Lafosse's clinic in Paris; they then travelled through England, Holland, Denmark, and Germany, and returned in 1775, having spent six years in preparing themselves for their work. This complete training entitled Wolstein to the consideration he received at the hands of the Emperor, who granted him his demands for a course of two years embracing anatomy, exterior anatomy, dietetics, breeding, shoeing, practice of medicine, materia medica, botany and chemistry; also a stable for thirty horses, six to eight cows and swine, and fifteen to twenty smaller animals. The result of this foundation has been the permanent establishment of one of the most methodical schools of Europe. The teachers for other schools were mostly recruited from surgeons and smiths who were sent by their Governments to the French schools, and a number of institutions were rapidly founded; in Hanover 1778, Dresden 1780, Milan 1787, Berlin and Munich 1790, London 1791, Madrid 1793, Giessen 1798, Petersburg (Russia) 1808, Naples 1815, Berne 1816, Zurich 1819, Skara in Sweden, Stuttgart and Utrecht 1821, Edinburgh and Toulouse 1825, Alexandria in Egypt, and Lisbon 1830, Cureghem near Brussels 1832, Warsaw 1840, Constantinople 1842, and others.

In England the Royal College of Veterinary Surgeons was founded in 1791 by a number of noblemen and rich cattle owners at the instigation of a French veterinarian, Vial de Saint Bel, who became the first director. It never received government aid, but has been supported by subscriptions of members of the society, by scholars' fees, by an annual subscription from the Agricultural Society and by the board of Animals in its Hospital. Two institutions of a similar nature have been undertaken in recent years in London by Ainslie and Gamgee, but they were short lived, though the latter did much to awaken an interest in scientific training. The Dick College in Edinburgh, Scotland, founded in 1825, has furnished many teachers and practitioners of renown, and by recent rich bequests promises to take on renewed vigor. The New School in Edinburgh under Professor Williams has just been re-established in fine buildings. Glasgow has also a school. In Italy the schools of Turin, Milan and Naples draw the largest number of students, while there are also institutions rich in their museums, libraries and laboratories at Bologna, Pisa, Parma and Modena, with secondary schools at Perugia and several smaller towns. The teachers are all government officers.

In Germany many of the veterinary chairs in the Universities have disappeared, or are little known; but that of Giessen has always held a well deserved reputation, and in Halle, Professor Putz is making a name for his chair through his valuable scientific work on the contagious diseases. The Berlin school is the great clinical school of Germany, while Dresden and Munich are well-known for their work in anatomy and laboratory research.

In addition to the schools of Warsaw and Petersburg in Russia, others have been founded in Cracow, Dorpat in Livonia, and in the Kassan; these schools are attached to the medical and surgical faculties and require five years' study. The course is most thorough, and from each graduating class are selected by competitive examination two students, who, under pay and at the expense of the government, are sent to the other schools of Europe to perfect themselves in special branches; on their return they pass an examination which if satisfactory attaches them to the faculty, which they enter when a vacancy occurs. The professional and military standing of veterinary surgeons in Russia is probably the highest attained in any country. In Italy the graduates rank as doctors and the diploma is a university degree. In Austria the faculty must possess both the veterinary diploma and that of Doctor of Medicine. In France and Germany the faculties are recruited from among veterinary surgeons, but while the military veterinary surgeons enter as officers in France, they only attain that grade in Germany on becoming senior veterinary surgeon of a regiment, but it must be remembered that military surgeons in Prussia were non-commissioned officers in 1840. In Holland the faculty was composed entirely of medical men until 1851, when veterinary surgeons were admitted as teachers. In England the position of a veterinary surgeon has much improved in recent years; while the military veterinarian became an officer in the early part of the century, the position of the practitioner kept steadily in the background of the medical man, who in turn remained an apothecary until the medical profession was entered by men with titles to their names. It has been mainly due to the efforts of Mr. Fleming, the chief of the Veterinary Department of the Army, that a great improvement has taken place in the profession, and the last ostracism was removed in June, 1883, when he obtained for the Military Veterinary Surgeon the entrée to court.

The course of study in the European schools, while everywhere thorough, varies considerably in its details. It is shortest in England, where three partial years only are demanded. These are devoted essentially to making practitioners, and during the long vacations the students are supposed to be serving with preceptors. For many years English instruction was too exclusively devoted to the horse, but recently much attention has been paid to cattle and other animals, and laboratories for practical teaching are being added, which promise a greater amount of scientific medical education. The *Veterinarian*, a monthly journal, was established in 1828, and has continued uninterruptedly since; there are many veterinary books in English, but unfortunately too many of them are of a routine character and better suited to the stableman than to the medical man. There are, however, numerous exceptions, and the names of Bracy Clark, Percivall, Williams and Fleming and others will always be honored. French, German and Italian books are comparatively limited in numbers, but are of scientific value. The oldest of veterinary journals, the *Receuil de Médecine Veterinaire,* was established in 1824, and the oldest German journal, the *Vierteljahrschrift für Wissenschaftliche Veterinärkunde,* in Vienna, in 1851. The Austrian and Hungarian institutions teach for three years, with a two years' course for higher grade farriers. In these there is much more laboratory work. The magnificent new institution at Buda Pesth has just been built on ample ground and fitted with every facility for theoretical and practical work. At its side the Agricultural School is in course of construction, and many of the chairs will be common to both. The German schools teach for three and a half years, while the Belgian, Italian and French cover four years in their course of study. The school at Alfort, near Paris, is par excellence the great clinical school, where a hundred animals can be seen each day. Berlin, Lyons and Vienna have large clinics and do more laboratory work. The Toulouse and Swiss schools, with that at Utrecht, have the greatest reputation for cattle practice, and at Munich special attention is given to diseases of the eye in the lower animals, and for this branch a journal is now published.

While there have often been individual veterinary surgeons well known outside of their own profession, it has been within very recent years that we can count, with pride, enough scientific men to show a marked elevation in the standing of our colleagues. But recently we have lost Ercolani, of Bologna, who was known throughout the scientific world for his researches in comparative anatomy, histology of the organs and animal parasites; greater, perhaps, to an Italian was his reputation as a patriot and a statesman in aiding the consolidation of Italy. Gurlt, also, was a veterinary teacher; Thiernesse, the late Director of the Cureghem School, was Secretary of the Academy of Medicine in Brussels; Bouley, to-day Vice-President of the Académie des Sciences in Paris, and Professor at the side of Milne-Edwards, in the Museum, was the greatest veterinary clinician ever known. Chauveau, the anatomist and physiologist, is Director of the Veterinary School in Lyons, and Professor in the Medical Faculty, in which positions he preferred to remain when he refused the chair of Claude Bernard; Bollinger, Siedemgrotszky, Heusinger, Goubaux and others whose names are well known in scientific journals, are veterinary surgeons. In the staff of assistants who accompanied Pasteur to Egypt to study the cholera was Hocard, a veterinary teacher in Alfort.

While preparing myself for my position here, I had the opportunity of visiting many of the schools of which I have just spoken, and of working in several of them, and I beg to be allowed this occasion to publicly testify my thanks and gratitude for the almost universal courtesy, politeness and aid which I received. It was first shown me as your representative, although in many cases it developed into warm personal friendships, and you will allow me to especially mention M. Bouley, M. Goubaux and the Faculty of Alfort, M. Chauveau and the Faculty of Lyons, M. Marey, the Faculty of the Vienna School, Professors Dieckerhoff, at Berlin, and Leisering, at Dresden, Lanzillotti Buonsanti, at Milan, and Mr. Fleming and Professor Williams, in England and Scotland. To the memory of Ercolani, I can only add the feeling of reverence which every one had who knew him personally.

IN AMERICA

the advance in Veterinary Medicine has been far from keeping pace with our national reputation for energy and self-preservation.

In 1806, Dr. Benjamin Rush, of this University, who had just been in Europe and had seen the success of the institutions then a few decades old, wrote a letter to the Agricultural Society of Philadelphia, and urged the importance of adding a Veterinary Department to the University. He called attention to the agricultural prospects of the country, and his letter was discussed before the Society in 1807, but nothing practical was done. Our domestic animals have steadily increased in numbers and in value since that time. We had in 1852—horses, 5,000,000; cattle, 17,000,000; sheep, 22,000,000; swine, 30,000,000; value, $600,000,000, and to-day we have in the United States, horses, 10,838,111—value, $765,041,308; mules, 1,871,079—value, $148,732,390; milch cows, 13,125,685—value, $396,575,405; oxen, etc., 28,046,477—value, $611,549,109; total cattle, 41,171, 762—value, $1,008,124,314; sheep, 49,237,-

291—value, $124,365,335; hogs, 43,270,086—value, $291,951,-221. Total, 176,488,329 animals—value, $2,338,215,268, and there are perhaps in the United States only some 500 Veterinary Surgeons who hold certificates showing that they are properly qualified to practice. An importation of the Russian Rinderpest into the port of New York would probably be followed by the destruction of 13,000,000 cattle, or $300,000,000 worth of property in twelve months.

Valuable breeds of animals have been imported and developed here until individual horses, cows and sheep, reach the enormous value of thousands of dollars. With the increase in the number of animals the ordinary accidental and sporadic diseases have of course increased in the same ratio, but with the augmented number of valuable animals wanted here and there over the country for breeding purposes, with the increased number of horses sent to the large cities for motors, and the thousands of cattle shipped for food in dirty, non-disinfected cars and boats, the increase of traumatic and contagious diseases has been in much greater proportion. Our Government has not done the first thing toward furnishing men capable of combating these scourges; even in the army the handful of veterinary surgeons are not recognized as officers, and have so little authority that, on an outbreak of glanders, they have not the power to condemn or sequestrate an animal if the Colonel thinks it has the disease in what his ignorance calls a non-contagious stage. The still smaller number of officers appointed by the Treasury Department to establish quarantine in order to protect us from imported diseases, has been composed of competent men, but too few in numbers, and without sufficient means and law at their disposal to take proper precautions. The contagious diseases are left for the States to cope with alone, each protecting itself as it sees fit, regardless of its neighbor.

The first veterinary record made in the United States was in Philadelphia, 1818, when we find in the registry of the clerk of the Eastern District that "James Carver hath deposited in this office the title of a book the right whereof he claims as author in the words following: 'The Farriers' Magazine or Archives of Veterinary Science, containing the Anatomy, Physiology and Pathology of the Horse ad other Domestic

Animals.'" Nine years later, John Rose, a Prussian graduate, settled in New York; about the same year the well-known Mr. Michener began practice in Pennsylvania. In 1851, a Mr. G. H. Dadd, a self-named Veterinary Surgeon, started a Veterinary Journal in Boston which lived about a year, to be revived in 1855 as the *American Veterinary Journal*, and the same year Mr. Dadd and several associates formed the first veterinary school in the country, which, however, soon disappeared.

The New York College of Veterinary Surgeons was chartered in 1857, and up to 1875 led a feeble existence; during this time it issued some eighteen diplomas. The Pennsylvania College, chartered in 1866, has continued its organization, but without a regular course of instruction. Two years later the Illinois Industrial University and Cornell added Dr. Prentice and Professor James Law to their faculties, and have given regular lectures. They were followed by Amherst (1869), the Ohio Agricultural College (1870), and Ames, Iowa. In 1875 the American Veterinary College was formed in New York from the New York College of Veterinary Surgeons, with Professor Liautard, a French graduate at its head. This school has steadily increased in value and number of students. It was the first medical school in the State of New York to require a matriculation examination. It has issued diplomas to 133 of its students, many of whom are in Pennsylvania. In 1862 a school was established in Toronto which, like the New York school, demands but two years' study. The Montreal school, founded in 1866, and directed by Mr. MacEachran, requires three winters. Recently a new school has been established in Chicago, and one at Minneapolis. These schools are dependent on scholars' fees for support, and with the precedents of the medical schools of the country, find that two winters are all that can with pecuniary profit be demanded for forcing into the heads of young men, often with but little previous education, the elements of medicine, with its vast amount of practical details, and the long row of diseases with their variations, in half a dozen widely different species of animals—less time than it takes for a shoemaker's apprentice to learn to cobble shoes, a clerk to become a book-keeper, or a farrier's boy to be trusted to put ordinary shoes on a horse. Harvard University established a Veterinary Department last year, and has a hospital of some size. It requires three years' study, and gives a thorough course of instruction. The school is in charge of Professor Lyman. The United States Veterinary Medical Association, formed in 1863, is composed of the leading veterinary surgeons throughout the country, and has held semi-annual meetings at New York and Boston until the present autumn, when the meeting was held in Cincinnati. In 1870 the late Dr. S. D. Gross, with his keen appreciation and ready heart for the demands of medical education, framed and presented the following resolutions to the American Medical Association, but his noble attempt to advance our profession failed—"was lost by a large majority."

"*Whereas*, We regard the cultivation of Veterinary Science of the most vital importance, not only to the advancement of human medicine, but also for reasons of political economy and agricultural interest;

"*Resolved*, First.—That we recommend the State and County Medical Societies to use their influence in the establishment and support of veterinary schools in their respective States.

"Second.—That they ask the Governors of their respective States to recommend in their messages to their Legislatures the importance of establishing veterinary colleges, and that appropriations be made to support them.

"Third.—That they recommend the Governor and the State Legislature, when organizing Boards of Health, to appoint one or more thoroughly educated Veterinary Surgeons to be associated as commissioners with other medical officers.

Resolved, That we recommend the employment of Veterinary Surgeons in the army, and one in the Agricultural Department, with rank and pay of other medical officers."

Our Veterinary Department has been contemplated for some time, and was rendered practicable through the acquisition by the University of this piece of land from the city of Philadelphia, and the liberality of Mr. J. B. Lippincott and Mr. Joseph E. Gillingham, who have furnished the means for these substantial buildings and outfit. Unfortunately a veterinary school cannot be ordered and completed like a primary schoolhouse, and we have but the cornerstone of what I believe will be a great institution.

We open to-day with the veterinary course of the first year only; our matriculants, twenty in number, have been required to show a certificate of sufficient previous education, or have passed a preliminary examination equivalent to that of the Medical Department. This requirement is too little for men who should be qualified to undertake the mathematics needed in a problem of chemical analysis, electricity, or the value of a muscular movement in the physiological study of an animal, or to handle easily the technical terms derived from Greek and Latin which medicine has found it proper to employ for nomenclature, but it is sufficient to guarantee that the student has enough education to appreciate what will be taught him, with great diligence and labor on his own part.

Our students will learn this year on the same footing as those of the Medical Department, the study of chemistry, with its practical courses, under Professor Wormley; they will follow the course of Materia Medica and Pharmacy under Dr. Miller and Dr. Alexander Glass, V.S., in order to familiarize them with the specialties required in compounding veterinary medicines; they will have the full course of Physiology from Professor Allen, and where this is inadequate for veterinary instruction, as it is necessarily prepared for the students of human medicine, there will be supplementary lectures by Professor Smith, who will also direct them in practical work with special reference to the domestic animals; the elementary course in general Pathology under Professor Tyson, will be the same for the veterinary and the medical students; Professor Rothrock will not only give them general Botany, but will pay special attention to the plants used for forage and their nutrient value; Professor Parker, in his course of Zoology, after giving them the general laws of the development and classification of animals, will dwell upon the helminths and animal parasites; the course of Anatomy will embrace the horse, cow, sheep, goat, hog, dogs, cats and poultry, and in the course of Histology the tissues of these animals will be used; from the microscope the student will go to the blacksmith's shop, where he will learn to forge and to shoe the horse's foot. This last course has never been practically carried out in the English-speaking schools, but is essential to the veterinary surgeon. He will never be a farrier, and in practice will avoid even taking off a shoe when he can get any one else to do it for him; but shoeing is the cause of nine-tenths of the surgical evils in the horse, and without a thorough practical knowledge of it, it is impossible to obtain from or show a blacksmith what one wants.

In the second year, medical or organic Chemistry will be taught and examinations will be held, the course of Physiology, Botany, Zoölogy and Anatomy will be finished, the students will commence their lectures in therapeutics, with practical demonstrations of the effects of drugs on the domestic animals. They will continue the course of general Pathology. With the second year will commence the lectures on Surgical Pathology, Internal Pathology and the contagious diseases or practice of medicine. These same lectures will be continued the third year with the addition of lectures on obstetrics and zoötechnics, or the laws of breeding and raising animals, and the modes employed for obtaining the greatest use from them, as they may be destined for animal motors or machines for the production of milk, wool or flesh. A course will be given on the preparation of butcher meat, showing the most humane methods of slaughtering animals for food, the preparation of the meat and the signs of unhealthy or diseased flesh in the living or dressed animal. There will also be lectures on Sanitary Police, familiarizing students with the inadequate laws of this country and those of other countries, which they may use as models when called upon to consult in these matters. With the commencement of the third year the student will enter the hospital, and during it and the following year will have direct charge of the sick animals. They will keep the clinical records, administer the medicines, perform minor operations, and in case of death, make the autopsies. Each in turn will serve in the hospital pharmacy and prepare all medicines required in the institution.

Such, gentlemen, is the plan of study which we have laid out for making veterinary surgeons. This training, thoroughly carried out, will give us men fully capable of being the scientific peers of any Doctor of Medicine. It will form men completely fitted for any trust in an animal epidemic or in the minor details of a routine practice. A man with this education will hold his head up among his fellows, and when a stableman calls for a "horse doctor" will feel that he is called out as a respected professional man to do good, and that he is beyond the suspicion of being asked to use his knowledge to share in a deception or a fraud.

For the instruction of the first year we are as fully equipped as a school can be at its beginning, with but a small museum, and the rough edges of the various parts of this educational machine still unworn.

For the second and third years we are not yet prepared, and we depend upon your generosity and that of your neighbors to complete this department. We have here such a piece of ground as is unobtainable in any other large city in the United States, and if we take advantage of it before it is appropriated to other needs, we will have an establishment equal to any in Europe. We need stables for at least fifty sick horses at once, which should be built with the prospect of enlarging in the future. In this hospital we will take sick animals to board, and it in part will be self-supporting; but there will be many animals with diseases tedious to treat, which will be abandoned by their owners, and we need a fund for the support of such cases. There are many cases of disease among the horses of poor carters, which are readily curable, but the owner cannot afford the fees of a Veterinary Surgeon, nor the expense of an animal standing idle and eating the food which its work should be paying for; these are the cases which furnish many of the examples of misery that the Society for the Prevention of Cruelty to Animals is called upon to alleviate; in many cases the driver is not naturally brutal, but at home there are wife and children to be supported, and the suffering beast is the best he can afford. We need a fund for the support of such animals, which will be judiciously sent us by the Agents of the Society for the Prevention of Cruelty to Animals and by the practicing Veterinary Surgeons of the town. Such a fund will be a double charity, the suffering animal will be relieved, and the knowledge that it can be done without depriving a poor owner of his daily bread will induce the latter to be more charitable himself, We need a cattle dairy of at least fifty cows. This should be largely self-supporting after once established; it will enable us to teach the students practical obstetrics and many of the details of cattle practice of which the usual veterinary graduate is absolutely ignorant; we need dormitories for the students where those from away can be comfortably lodged and learn their Alma Mater is their home for the time. For our veterinary students who are to give personal supervision to the animals in the hospital, it is essential; for the entire university, it is a necessity. Harvard, Yale or Princeton Alumni meet each other like Free Masons, and though otherwise strangers, they become rapidly intimate over the past, present and future of their college, because they roomed in the same building, messed at the same table, and had the same associations; this feeling is absent in the Alumni of the University of Pennsylvania, except, perhaps, among the medical graduates, who had their small cliques in their boarding houses. Dormitories will do much to make the university popular, they will tie the graduate's memories to his student life and induce him to take an interest in the future of the institution. We need a Botanical Garden, and with ample frontage for all our buildings on the side of this triangle, a beautiful spot is left in the centre for its construction; there exists already a small fund for this purpose left by the late Dr. George B. Wood. We need endowments for the Chairs. The Chair of Surgery must be filled before the next year, and we should be untramelled in our choice and be able to select the best talent without being influenced by the pecuniary value of so many students.

In fine, gentlemen, we need, and I am sure we will have, your support for this undertaking.

ART. II.—NOTES ON VETERINARY MEDICINE IN GREAT BRITAIN.

BY N. S. TOWNSEND, M.D.,
Professor of Agriculture, State University, Columbus, Ohio.

In a recent visit to the British Isles, the principal object of which was to ascertain the condition there of agricultural education, the writer had some opportunity to become acquainted with the state of veterinary science and practice, and to judge of the estimation in which the veterinary profession is held by stock owners and the public. Possibly a portion of your readers may be interested in the conclusions reached upon veterinary matters.

In nearly all parts of Great Britain there appears to be a sufficient number of able veterinary practitioners. In the main they are men of good education and of general scientific as well as professional training, consequently they appear to have good social standing, and to enjoy the confidence of the public. In many cases it was pleasing to see evidences of comity and mutual respect between physicians and veterinarians, and of a desire to share in efforts for the better sanitary condition of the people. The number and standing of veterinarians in Great Britain is doubtless to be explained in part by the high character of their veterinary schools. The veterinary college at Camden Town, near London, and the two colleges in the city of Edinburgh, all of which were visited, have complete equipments and very able teachers. Several opportunities of attending the examinations of veterinary students showed on their part praiseworthy determination to secure the same broad and scientific training that is understood to be necessary for the young physician. The number of associations for mutual improvement among veterinarians and the profitable character of their meetings, some of which the writer was permitted to attend, may also help to account for the good standing of the veterinary profession. Observations and investigations made by individuals, when presented and discussed at the meetings of an association and reported in veterinary periodicals, which all take, are then the common property of the profession and a benefit to all.

The owners of stock who were met with at the Royal Agricultural Society's Exhibition at Shrewsbury, at the Highland and Agricultural Society's Exhibition at Edinburgh, and at two exhibitions in Dublin, evidently appreciated the value of the assistance they so often require from veterinarians. This appreciation appeared to be due not alone to the amount of benefits received, but also to the general knowledge which stock-owners there possess of the nature, symptoms and effects of disease. In the houses of farmers it was not uncommon to meet with valuable veterinary books; some of these were old, such as Clater's, Blaine's, Youatt's, or Percivall's; but still oftener some of the later works were seen, such as those of

Fleming, Williams, Gamgee, Armitage, or Steele. The great advantage which farmers derive from a knowledge of animal diseases was seen in the promptness with which serious disease was recognized and professional help obtained, and in the less frequent resort to injurious quack nostrums.

Perhaps a word or two by way of application may be tolerated. In many parts of the United States outside of the large cities, educated veterinarians are not to be found, and stockraisers living in the country often suffer loss in consequence. Does not this promise a profitable occupation for young men who are willing to make thorough preparation for veterinary practice? In many of the older States veterinarians are so few and so far between that they can derive but little stimulus to study or research. Is it not probable that a well-educated veterinarian would often be welcomed to membership in ordinary medical societies, and with mutual benefit, inasmuch as the medical and veterinary professions have so much in common? Perhaps it would pay some of our young country doctors who are impatiently waiting for practice to take a winter's course in a veterinary college. They might afterwards make themselves more serviceable to their patrons, and it is not probable they would suffer in the estimation of sensible people if found always ready to relieve suffering, whoever or whatever the subject. Finally, will not a more thorough study of domestic animals, both in health and in disease—such as appears to have been made abroad—be good for the animals, profitable to their owners, and lead to a better appreciation of the veterinary practitioner?

ART. III.—SCARLET FEVER AND MEASLES IN DOGS AND CATS.

BY JOHN C. PETERS, M.D., NEW YORK.

Copeland, Ziemssen, and many other writers allude to scarlet fever in dogs, but in such a perfunctory way that nobody pays much attention to it. Some months ago I attended a case of scarlet fever in a young lady who had a pet pug dog. It so happened that I had seen this dog several times when well; finally it sickened and seemed to have what is called "distemper," to which all young dogs are subject, like children to scarlet fever and measles. Of course I paid little or no attention to it, but recollect that it appeared to have a feverish cold with sore eyes and throat, refused its food, and rapidly fell away in condition. It was sent to a dog doctor, and soon after its young mistress had a decided outbreak of scarlet fever, about which there could not be the slightest doubt. Her eyes were affected more than is usual in scarlet fever, and the mother repeatedly called my attention to the similarity of some of the symptoms of the dog-distemper to those of her daughter. I warded off these gentle attempts to establish a connection between the disorder of the dog and that of its young mistress. Many months after, when I became interested in the possible occurrence of scarlet fever in horses, the mother again stated her belief, which she had never abandoned, that the dog had had the same disease as her daughter, and that the canine disorder, as I well knew, had the precedence in point of time. Subsequently I learned that the dog had been taken along several times by a waiter man when inquiries were made about another young lady sick with scarlet fever.

This case standing alone would, of course, form a very slender basis for anything else than to suggest that sick dogs should be examined more carefully by doctors in the future. Soon after I heard that Dr. Alexander Hadden knew something about scarlet fever in cats, and, after several conversations with him, persuaded him to write out his opinions, as follows:

"*Dear Doctor:* About fifteen years ago, my attention was called to scarlatina in animals by an article published by the well-known Dr. Snow of London, in a medical journal which I have lost, and the name of which I have forgotten. The purport of his paper was that cats were often carriers of scarlet fever to families; that they were subject to this disease, and often communicated it to their kind and also to human beings.

He also stated that they died of this malady, and then presented the common post-mortem appearances of unmistakable scarlet fever, especially in the skin and kidneys. His statements were so positive that I bore them in mind, and, when other well-known sources of the contagion were not present in the cases I met with in practice, I inquired about the condition of these common house pets. The first cases which fastened my attention to this point still more were three children in one family all attacked with scarlet fever about the same time. They had not been exposed to scarlet fever in any known way, for they had not been out of the house for several weeks, as they were snow-bound in the country and the weather was very cold. There was no scarlet fever in the neighborhood, and few or no visitors had come to the house. I asked if there were any sick cats in the family, and was told that the house cat had been ailing for a week with sore throat and eyes. The animal was sought for but could not be found, although it had been seen lying beside the stove in the morning. It never returned, and therefore I was left with incomplete evidence. The next case which presented a like suspicious history, was in a boy aged ten years, who, about four days before I was called, had been caring for a sick kitten which he had found in the street and which died on the following day. The lad had not been exposed to the contagion from any human being as far as could be ascertained; there was none in the neighborhood where he lived. His attack was well marked and very virulent, so that he died on the third day. In the following week his little sister was taken with the same disease, scarlet fever, but had it less severely and recovered. In this case, also, I was deprived of the opportunity of obtaining positive evidence for or against the suspected origin of the contagion.

"On several occasions I tried to produce scarlet fever in kittens by exposing them to the disease, but obtained no absolutely satisfactory results. The plan I pursued was to place kittens about six weeks old in bed with children suffering with scarlet fever, and allow them to remain there parts of several days. Some of these animals became sick with catarrhal affections of the eyes and throat, but none exhibited the rash upon the skin, or characteristic glandular inflammation of the neck, or marked renal conditions."

I also induced Dr. Erskine S. Bates to write out his experience:

"Dear Doctor: In looking over my case-book, I find the following notes, which may be of interest to you and others.

They are necessarily meagre, as the subject did not at that time possess the interest it will now: On March 6, 1877, I was called to attend Maggie W., aged seven. Her mother stated that the child had been very sick all night, and she was afraid she had caught some disease from a strange kitten which she had found in the hall some days previous. The kitten was sick when found, and the child had been nursing it ever since. I did not attach much importance to the mother's fears, but found that my little patient had scarlatina anginosa, and so informed the mother. The next day the mother again referred to the case of the sick kitten and told me that the family cat was now also sick, very much like the kitten, and asked me to examine both animals. I did so very skeptically, and found both cats with high fever, scarlatinous sore throats in different stages, and some discharge from the nose; they were both very sick. As the child was quite ill, little attention was given to the felines beyond watching them casually from day to day. The family cat died on the sixth day; the kitten recovered, as did the little girl. Other cases of scarlet fever subsequently developed in the same house, but I am not sure whether any other of the felidæ contracted the disease.

"Two years after, I was called to see a young man, aged twenty-eight, who had recently married and set up housekeeping in a tenement building on Avenue A. His family consisted of his wife and a pet terrier dog. The house had a bad reputation on the score of healthfulness; family after family would move in, contract some form of scarlatina, lose one or more children, and then move out. The newly-made family man had been domiciled there scarcely a week when he was attacked with scarlatina maligna, and died in forty-eight hours. The pet dog persisted in lying on the bed, as near the head of his master as he could get, all through his owner's illness; and, on the same day that his master died, was taken with convulsions, sore throat, rapid swelling of the glands of the neck, high fever, suppression of urine, etc., death closing the scene thirty-six hours after the convulsions which ushered in the attack. The train of symptoms manifested by the animal was so similar to that of his master that the mourning friends commented on the matter. I had no doubt then, as I have none now, that the dog died of scarlatina maligna. Subsequently the house was thoroughly disinfected and renovated, and I am not aware that any peculiar fatality has since attended its occupants."

Even if the animals are not sick, they may convey the poison in their fur, as was suggested by Dr. Snow, whose opinions as the originator of the whole doctrine of water-contamination in the conveyance of cholera, typhoid fever, and other diseases, are entitled to the highest respect. Dr. Janeway has reported a case in which diphtheria was conveyed from New York to Florida in the fur of a toy rabbit. Dr. Williams, President of the Royal College of Veterinary Surgeons, and Principal and Professor of Veterinary Medicine at the Veterinary College, Edinburgh, says, p. 253 of his "Principles and Practice of Veterinary Medicine," "I can compare dog-distemper to no human disease except measles, and the points of analogy are very great. In both diseases catarrhal symptoms are manifested; they are infectious; they generally occur but once in a life-time; they chiefly affect the young; in almost all cases of distemper there is some *cutaneous eruption or rash* and desquamation of the cuticle; catarrhal ophthalmia, bronchial and pulmonary inflammation, and dysentry are complications of both diseases," etc.

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ART. IV.—ENZOÖTIC ABORTION IN COWS.

BY F. S. BILLINGS, V. S.

First, let us understand what we are going to consider.

Abortion is an accident: it is a result of the action, in this case of *an unknown something: it is not a disease.* Even pathological changes which might be supposed to anticipate so serious a disturbance do not seem to have attracted much attention, so that we shall have to skip this part of our subject with the remark, that some authors have observed fatty degeneration in the epithelial covering of the placentæ, but have given us no indications leading to what produced it. Fatty degeneration of this nature is a cause of abortion in women, but never of this character. Enzoötic abortion is known to veterinarians and agriculturists, and is essentially a bovine malady, although "Fleming's Obstetrics" calls attention to eruptions of this trouble in other animals and even in women some time in the last century. They are not known to the medical profession of our day, however.

In my paper on Eclampsia, in a recent issue of the JOURNAL I stated the difficulties which surrounded that subject with reference to its nature and causes. Any one who undertakes the study of abortion will find it a still more unsatisfactory task.

So far as knowing anything about it is concerned, the farmer knows as much as the veterinarian, and the latter knows next to nothing. All we know is:

1st. That it occurs.

2d. That the manner of feeding, housing and care, seem to play no essential rôle in originally causing it.

3d. Observation and experience supported by a very few illy controlled experiments, seem to indicate that we have to do with an accident which has for its cause influences of an infectio-contagious nature.

I have said that veterinarians knew very little about it; this is especially true of English and American authors. Williams does not make any mention of it, and it should not be expected of Robertson, as his work is on equine maladies. Steel is most unsatisfactory, and Woodruff Hill is drawn from Fleming who, in his turn, is influenced by the opinions of Continental authors. I know nothing about it myself, and the conclusions which I shall advocate are drawn entirely from the writings of others. It would really seem that very little attention has been given to it in England, if we are to judge from the evidence given in the *London Veterinary Journal*, the leading one of England. It is not indexed from 1875 to date with but one exception, and that a translation of a German article upon the subject. I have taken pains, also, to go through the reports of the Veterinary Associations published in that journal, and have been unable to find any allusion to it; but these things not being indexed I may have passed over some discussions.

As the papers and discussions of these meetings are among the most valuable publications in this journal, we would modestly suggest that their subjects be indexed in the future, as it would greatly increase the value of the publication as a work of reference, which all journals should be.

If we turn to French and German literature we shall not find very much satisfaction, though more has been written upon the subject and more thought given to it: the hypothesis that it is due to infection is well defended and supported by some experimental proofs.

The two best considerations of the subject are of purely American origin, and are to be found in the lengthy report of commissioners appointed by the State of New York to investigate the subject, published in the "Transactions of the New York Board of Agriculture" for the years 1867, '68 and '69, and in the "Report of the Farmers' Meeting of the Massachusetts Board of Agriculture for the year 1883." The first-named authorities do not seem to have arrived at a suspicion of its infectio-contagious origin, as we shall eventually see; while the New England farmers appear to have become more or less convinced of it.

After looking over all these authorities the reader will, like the writer, come to the conclusion that it causes an immense loss to the agriculturist and breeder; and further, that it is the duty of our States to spare no expense in having its causes searched after in the most exact and experimental scientific manner.

Mr. Fleming has called attention to its occurrence earlier than the present century; nevertheless, it did not attract much if any attention until the latter part of the last century. Our New England farmers all speak of it as something belonging to their day and generation, and as an ever increasing evil. It should, I think, be classed with what I have termed "Association or Civilization Diseases," though, as said, not a disease *per se*, that is, it is due to causes which gradually find their origin in the long-continued habitation by animals of the same species, in the same locality, until special unknown conditions are produced which favor, or lead, to the development of specific infectious germs.

That it can cause most serious losses to the cattle interests of our country is most effectually shown by the New York Commissioners' Report.

From various townships they collected statistics of 35,919 cows, reported as having been pregnant: of these 2,057, or .057 aborted.

The percentage of abortions among the cattle of 14 townships was .06. The average number of cattle aborting in each, 22; the average number of affected herds, 29; of non-affected herds, 19.

I would here state that Mr. Sturgis, of the Wyoming Stock Growers' Association, recently wrote me that while, from their manner of raising cattle, it was impossible to gather statistics, still it could not exist to any alarming extent as no complaints had been caused by it among range cattle.

The report alluded to further says with regard to the period of pregnancy at which abortions were noted to have occurred:

In the 1st month,	Aborted,	0
" 2nd "	"	1
" 3d "	"	10
" 4th "	"	66
" 5th "	"	106
" 6th "	"	198
" 7th "	"	341
" 8th "	"	360
" 9th "	"	238

These figures agree with the observations of the most competent veterinary observers, who look upon the seventh and eighth months as those in which abortion most frequently occurs.

With regard to the time of the year in which the accident is likely to occur we find the following:

April,	Abortions,	86
May,	"	27
June,	"	2
July,	"	2
August,	"	1
September,	"	18
October,	"	40
November,	"	115
December,	"	215
January,	"	354
February,	"	426
March,	"	358

Such statistics have but little etiological importance; they show, however, that the increase in the number of abortions bears a direct relation to the period at which most cattlemen desire to have their cows "come in"; that is, to be ready for the spring grasses. They show further that some general cause must be at work at such times other than the manner of feeding, etc., for if ergot, as has been assumed, were the cause, the cows would be as liable to gain access to it in November and December, as in January, February, and March.

The New York Commissioners also gave considerable attention to the influence, if any, exerted by the age of the bull used to serve the cows, and report:

	Bull	Bull	Bull
No. Cows impregnated by	1 year old.	2 years old.	3 years old and over.
Carried to full term, . .	9,740	19,530	1,482
Aborted, ...	522	1,340	74
Per cent. of abortions, . .	.05	.064	.047

which gives a slight advantage for the older bulls.

In the "*Mittheilungen aus der Praxis*," in Prussia, Fischbach reports a case of two bulls, one three-and-a-half years old, the other, two. Some forty cows were served by the older bull, all of which aborted between the sixth and thirteenth week of pregnancy, while the accident did not occur in any of those served by the younger. The most exact examination did not reveal any reason therefor in the bull.

Roloff reports a case in which *all* the cows in one stable aborted, while of those in another on the same farm none aborted. Care, feed, ventilation, etc., were exactly alike in each stable.

In another stable where traffic caused an almost constant change in the animals, which were of every variety of breed, and gathered from all parts of Germany, nearly every pregnant cow aborted one after another.

In another, abortion still occurred after every possible change in the manner of feeding.

Abortion has been frequently observed to occur in cows fed upon brewery and distillery refuse, in Germany, by Richter, who claims that, looking upon an insufficiency of salt in such feed as the cause, it entirely ceased when this failure was made up by the addition of the proper quantity of saline ingredients to the food. It is only necessary to say that this is not the kind of abortion we are considering. Roloff also reports cases in which he has observed the trouble existing in stables for a number of years, constantly increasing until, finally, nearly every pregnant cow aborted, which shows that the cause had become domiciled.

In a stable on a farm in Saxony one cow after another aborted while among those in another on the same farm none occurred though they all had the same care, but upon a maid assisting at an abortion in the first stable and then going back among the cows in the second stable, to which she regularly attended, abortion set in among them and continued for a long time.

These examples, particularly the last one, are sufficient to indicate that there must be some special specific cause for this trouble which we should consider, and that this is of an infectious or contagious nature.

It must be remembered that, while all contagious diseases are of an infectious type, still all so called infectious maladies are not necessarily of a contagious nature.

ETIOLOGY.

I have already said that the New York Commissioners did not seem to have had any idea that the cause of this disturbance was an inficiens, hence it is but just to them, and in accordance with our present purpose, to let them speak for themselves. They appear to have come to the conclusion that abortion was due to unnatural conditions produced in cows from the inconsiderate forcing process to which man's greed puts the sexual and milk producing organs of cattle, both with reference to degree and also to the unnaturally early age at which we cause these functions to be called into full activity.

After describing the manner of "selection" by which man has gradually produced our present milk machines, they tell us that "if, however, instead of following these rules, the attempt be made to get a large increase at once; first, by forcing the uterine reproductive apparatus into activity before the animal has arrived at full maturity, and afterwards by continuing the drain upon the mammary secretion at the same time that a second fœtus is getting its supply from the placenta: by the first practice the uterine reproductive apparatus is weakened, and a liability to abortion established; and by the second, the natural supply of blood, which should go, during pregnancy, to the uterus to nourish the fœtus, is continued to be drawn in the other direction towards the mammary gland, arrest of development from inanition is endangered, and when it occurs the fœtus is expelled as a foreign body." It is scarcely necessary to say that such induced conditions do not have, for themselves, any self-evident characteristics to lead us to consider them as playing any essential part in the production of the form of abortion we are considering.

Even this report frequently quotes cases of abortion appearing in herds on the introduction of a cow from a farm on which it had prevailed, but this fact does not seem to have made any impression on these investigators.

Though the causes inferred by the New York Commission are very suggestive in many ways of the evils to which the greed of breeders subjects the bovine family, still they do not coincide with the generally accepted views of to-day.

The New York Commmissioners sum up their work as follows:

"The affirmative results obtained are:

"1st. That cows which have first calved at or under three years of age, are more liable to abort during their subsequent pregnancies than those that first calve at three years of age or over, in the proportion of 5 to 3.

"2d. That cows subjected to removals at any time, are liable to abort over those raised on the farms, in the proportion of 7 to 4½."

(This requires close observation.)

"3d. That cows subjected to removals during pregnancy, are liable to abort over those not moved at such times in the proportion of 9 to 2."

"4th. That arrest of development is the condition immediately preceding abortion."

In support of this they tell us that "of 4163 abortions in the year 1867-8, 3597, or 86 per cent., of the young were reported as 'dead' at the time they were aborted."

Still another cause has been considered by many to play a very essential rôle in the production of enzoötic bovine abortion, viz., ergot. The conditions produced are known as

ERGOTISM,

of which we heard so much during the spring of 1884, from Kansas.

For a very exact and detailed account of the invasion of grains and grasses by this parasite, we must again refer the reader to the New York Report, for to do it here would make our paper too long for a journal article, and we object to continued papers when they can be avoided.

The great value of the work of the New York Commissioners is that they have well prepared the ground for further investigation by showing that many things which have been assumed to have causal connection with bovine abortion do not have any, at least with its enzoötic form.

With reference to plants liable to cause it, they say "that they have been unable to find any plant, in itself healthy, of which there is a reasonable probability of its being the cause of this trouble, affecting as it does so large a number of farms."

"Ergot was found on ten different plants, of which six are among the more common meadow or pasture grasses."

No positive connection could be discovered between the existence of ergotized grasses and abortion.

Some cases have been reported in veterinary journals which, if taken by themselves, would seem to indicate that ergot can cause abortion in cattle.

Heusinger (*München Zeitschrift, vol. ii, p.* 101) says: "Ergot that is gathered with grains or grasses in an extremely hot and dry harvest season not only falls out easily but is of a very pale color, and inactive; while in wet summers the ergot is black, not easily detached, and possesses its active properties to the fullest degree."

He again quotes from "*The Academy*," an English publication, of January 9th, 1875, "that in New Zealand an outbreak of enzoötic ergotism was observed in cattle and sheep. It was not of a fatal character, but interfered greatly with the productivity in young of the animals. It occurred in the fall; the animals were lame and had convulsions. It ceased upon changing them to other pastures."

Hazelbach, G. & H., xxvi, p. 211, reports an interesting case of abortion in cows. He was called in consultation by a farmer who reported that eleven of his best cows had recently aborted without any known cause. The cows all appeared healthy, aside from the consequence of this accident. Their food was wheat from the field and straw. On going to the field a large quantity of rust—*Ustilago Moidis*—was found upon the wheat, of which H. gathered quite a quantity.

He provided two pregnant bitches, one of which was due to whelp in three and a half, the other in one and a half weeks. He gave them one-half ounces powdered, of this fungus; and the next day, two drachms; violent pains soon developed after the second dose, and in two hours abortion occurred in the bitch due in three and a half weeks, and soon after in the other. No further cases occurred in the cows when the wheat was taken from them.

We have already alluded to the singular outbreak in Kansas, which one veterinarian declared positively to have been "Contagious Foot and Mouth Disease," an opinion I believe he still adheres to, while two others declared it to be "Ergotism," and a third affirmed it to be some form of "Foot-rot," an indefinite term, for ergotism can be accompanied by necrosis in the extremities.

We admit our inability to come to any definite conclusion on this testimony, as we have it in the *American Veterinary Review*, but are firmly convinced that it was not the "Foot and Mouth Disease," while from our appreciation of Dr. Salmon's ability, we feel inclined to adopt his opinions, supported as they are by the later published observations of Dr. Law. While each attempted to prove the other wrong in his diagnosis, it is much to be regretted that no exact and detailed account of the symptoms, at least of a positively satisfactory nature, can be drawn from these reports.

It is said "that the bodily temperature was but little augmented; that the appetite remained good throughout, and that there was no trouble in masticating or swallowing."

Another says "the animals stopped eating grain, but ate hay; seemed very stiff; frothed at the mouth, and appeared in great agony. Coldness of the extremities, with necrosis of the whole or parts of the lower portion, was not uncommon."

Another says "the mouth was hot and reddened. Three blisters were to be seen on its roof, and two on the tongue"—of one animal.

Still another tells us "that he does not consider the trouble to have been due to ergotized rye, but rather to have been the 'foot-rot,' which is quite common at times." In proof of this conclusion, he says that "on Mr. G's. farm, where the disease prevails, there is no ergotized rye in the hay; but stranger still, *Mr. B. has fed seventy-five cattle all winter on hay that is full of ergot and only three heifers and one cow are affected;* another puzzle is presented by Mr. K's buying sixty-three young cattle of Mr. D. on the 15th of December, '83, and on the 23d nearly all were down with the disease. K's hay contained ergotized rye, while Mr. D. had no sickness in his herd."

This last authority, Dr. Hopkins, quotes Finlay Dun as saying: "it—ergot—does not, however, as in man, cause gangrene in the extremities." Dun (p. 294), quoting Dr. Wright, says: "Gangrene of the extremities is not, however, produced so readily as in man," which is not saying that "it does not cause gangrene." Again Dun says: "Mules fed on it—ergot—lose their hoofs, and fowls lay eggs without shells." It is especially to be noticed, that even those veterinarians that looked upon the Kansas trouble as ergotism, do not record a single case of its having been characterized by abortion, or even a suspicion of it.

In this regard, Dun says (p. 295): "Concerning the power of ergot to induce contractions of the uterus and expulsion of its contents, there is still much difference of opinion. Amongst the lower animals it certainly has no power of producing abortions. It has been given in large and repeated doses to cows, bitches, cats, swine and rabbits in all stages of pregnancy, but without causing abortion."

With regard to its constitutional effects, he says: "when given for several weeks it caused, in dogs and rabbits, nausea, impaired appetite—the Kansas cows ate well—a weak and irregular pulse, diarrhœa, excessive fœtor of the secretions and excretions, paralysis, particularly of the posterior extremities enlargement of the limbs, contraction of the spleen, tubercles in the lungs and mesentery—? B.—impairment of all the senses, wasting and general debility."

V. Boeck—*Handbuch der Intoxicationen—Ziemssin*, (vol. 15, p. 576), says, with reference to its abortine action in woman: "the so frequently affirmed and denied influence of ergot upon the movements of the uterus, require but brief mention, as change of this organ in acute ergotism do not belong to the essential phenomena. Obstetricians have confirmed the fact that ergot can increase the intensity of the pains in pregnant woman, but many deny that it can cause the uterine contractions of itself." Schlesinger and Wernich, however, report having experimentally caused such contractions in the uterus of animals. Some veterinary authors deny this action. This action is not, however, the primary, but rather the secondary action of ergot. It is readily to be seen that ergot, even in large quantities, is not considered to be by any means a direct and sure abortivum. In this regard, and also with reference to the somewhat questionable character of the Kansas trouble, it would seem that our government should endeavor to procure a large quantity of ergotized grain—the ergot being right in quality, and carry on a long continued series of feeding experiments, under the supervision of an exact and competent veterinarian, upon cattle, and in order to test two questions at once, the cattle to be selected should be cows in the earlier months of pregnancy.

We come now to the consideration of what seems to be the cause of enzoötic abortion in cows, viz.: An Unknown Quantity.

AN INFICIENS.

We have already quoted quite a number of practical observations in support of this theory, and have stated that the most intelligent among our New England farmers have also come to the conclusion that the trouble is not only infectious, but also contagious.

As illustrating this point, Stockfleth—a Danish veterinarian—reports a case where eleven out of fifty-five cows aborted in one day. Also of one cow that aborted three times in one year.

Dr. Salmon (Mass. report) speaks as if there were grounds for believing that after the third abortion a cow might be expected to carry future calves to full term.

While we think we know his reasons for such an assertion, we have been unable to find any sufficient evidence for the same, and think it a question of significant importance, only to be settled by exact statistical observations. Farmers seldom keep a given cow that has aborted, long enough to enable us to satisfactorily answer such a question.

Brauer, a German veterinarian, reports that the trouble ceased in a stable after causing it to be carefully cleaned and disinfected. Dr. Salmon reports a similar experience, and one of my own patrons reports like results. Brauer caused abortion to occur in a gravid cow in nine days, after introducing into her vagina some of the lochial discharges from a cow that had just aborted. In another case, he saw abortion follow the same procedure in cows after the elapse of 12, 15, 21, 11 and 15 days.

He considers some unknown micro-organism to be the cause.

Lehnhert looks upon it as due to infection when it runs through a stable of cows.

He speaks most favorably of the results of cleansing and disinfecting. He produced it in two cows in the 7th month of pregnancy, in eighteen and twenty days by introducing the lochial discharge from aborted cows into the vagina.

He recommends the speediest possible removal of the afterbirth from the aborted cows, with the thorough clensing and disinfection of the birth passages, and the immediate removal of all gravid cows from a stable in which an abortion has occured. Weigel reports a wide spread enzoötic of this trouble which extended over six large farms.

Roloff thinks it to be due to some infectious miasma which enters, *per vaginam*, into the uterus. He has frequently seen the vulva and vagina injected and swollen antecedent to the accident. Disinfection and the removal of gravid cows is generally followed by favorable results.

Franck has similar views, which he has supported by experiments of the same nature as those of Brauer, with like results. He makes a seeminglybro ad statement when he says "that ichorous septic material, when brought into contact with the sexual organs, can cause abortion." We know that he means the lochial discharge from aborted cows, however.

He claims to have seen or found in the vagina of such cows a development of leptothrix bacteria upon the mucosa, which gradually increased in quantity until abortion occurred.

This is the evidence. What does it suggest?

1. It shows the value of close observation and of the application of general principles to conditions of which we know very little about.

Experience, experiment and observation have thus taught us that although we do not know the cause of enzoötic abortion in cows, still that we can prevent its further extension in a given herd by the timely cleansing and disinfection of the stable, and the isolation and removal of the remaining pregnant cows to other quarters.

Large places should have a sufficient number of "lying-in boxes" to which cows should be removed in time. After use, they should be scalded out, white-washed and disinfected, exposed to the air daily, and never used except for calving cows.

When not in use they should have bare walls and floor. No litter, straw or stable utensils should be left in them. Before use they should be once more disinfected, freshly littered by persons with other boots and clothes on than used in general about the cattle in the main stable.

Such a procedure will put an end to the extension of bovine abortion, if we never find the cause. No enzoötic outbreak need ever trouble the large cow-owners if this treatment is adhered to.

2. That the isolation of a specific, abortion-producing germ is a matter of the greatest difficulty on account of the ill-apposition of the vulvo-vaginal walls and the consequent presence of almost innumerable numbers of many varieties of micro-organisms at times, and in cows when no abortion is occurring, and even when not pregnant.

3. Can other septic materials, such as putrifying meat, mixed with water, which is full of germs that cannot be distinguished from many of the above-mentioned forms, also cause abortion in cows if injected into the vagina?

4. Can lochial discharges from aborted cows—assuming that they can produce it in cows—also produce abortion in other gravid animals—mares, sows, dogs, etc.?

5. What is the condition of the *os uteri* during the various stages of pregnancy?

6. What is the condition of the blood, liver, spleen, etc., of such cows with reference to germ infection?

7. Experiments should be made with the lochial discharges of aborted cows upon the more rugged native animals, as well as upon the higher grade animals generally held by butter and milk producers at the present time.

8. Statistics of every conceivable variety should be gathered by competent men.

9. These questions can only be settled by the State, which should supply all the money to carry on the necessary researches.

10. But little can be learned from fanatical observations alone. Experiment is the only method which will lead to satisfactory results.

11. None but the most scientifically qualified veterinarians are suited to such work. Mere practical men, no matter what reputation they may enjoy, wont do.

ART. V.—NOTES, WITH COMMENTATIONS, ON THE PSYCHOLOGY OF THE CHIMPANZEE (*TROGLODYTES NIGER*), NOW IN CAPTIVITY AT THE CENTRAL PARK MENAGERIE, NEW YORK.

BY DR. C. PITFIELD MITCHELL.

The following observations and experiments were instituted with a view more especially to adding, if possible, to the results of previous investigations of emotional expression in the anthropoid apes. This was, throughout, the ruling purpose; yet whatever offered itself in the course of the inquiry, was recorded if it appeared to be of sufficient interest or of scientific value.

Elaborateness has been given a secondary place to accurateness of observation. Many of the experiments were several times repeated, and other opportunities were used for the correction of errors and the filling in of omissions. Owing partly to the transitoriness of the phenomena observed, there is, doubtless, still room for further purification as well as for further amplification.

I am much indebted to Dr. W. A. Conklin, the Superintendent of the Menagerie, for very valuable assistance and liberal courtesy.

The subject is a male chimpanzee, now (November, 1884) about two years old. He arrived in this country from Liberia, West Coast of Africa, in June of the present year.

Sept. 30, 1884.—On being introduced he offers his right forehand, and grasping one of my fingers, attempts to put it in his mouth. [He appears to enjoy squeezing the fingers of his friends between his teeth. But this ought not, I think, to be understood as simply an expression of attachment. He does, it is true, show affection by kissing and licking; yet it is his constant habit to interrogate the nature of anything by putting it to the tests of teeth, tongue, and lips. The very mobile and prehensile lips of the chimpanzee are probably in constant use as tactile organs, and he is plainly much swayed by considerations concerning the edibleness of things; therefore, whatever comes within the range of his prehension is instinctively carried to the mouth. The same proclivity has been frequently observed in infants.

The extension of the hand, on meeting an acquaintance, is made with a pleased look of recognition, but without perceptible contraction of facial muscles, and is unmistakably the outcome of gratified social feeling. On these occasions the body is sometimes couched submissively and the back is turned in solicitation of a friendly scratching. The hand is offered to any one towards whom he is disposed to be friendly.]

Being placed by Mr. Jacob Cook, his keeper, in a chair before a table upon which lie a bowl of milk, a spoon, and a napkin, he grasps the spoon with his right fore-hand and feeds himself, wiping his lips with the napkin held in the left fore-hand. [These super-simious table manners have been acquired, Dr. Conklin says, with singular aptness, under the tuition of Mr. Cook. In the feral state the chimpanzee drinks by sucking through the lips, precisely as man drinks without artificial aids. Once the spoon was taken from him, that I might see him drink in the natural way. For a moment he seemed perplexed by the loss, and whimpered to have the spoon returned to him. That a habit so well organized as the natural mode of drinking should thus facilely be supplemented by a new adjustment, exemplifies again the plasticity of instincts * in general, and perhaps of anthropoid instincts in particular.]

In using the spoon the co-ordination of movements lacks precision, but none of the milk is spilled. He expresses gustatory relish by smacking the lips. The appetite being satisfied, he denotes the fact by slapping the table with the left fore-hand. [This action is habitual, and is not improbably intentional in that he thus attracts the attention of his keeper who usually after feeding him takes him in his arms. The primitive cause of the action, perhaps, lies in a feeling of uneasiness, having completed something that no longer offers itself as an object upon which he can expend his super-abundant energy. Restlessness is one of the chimpanzee's prominent characteristics, and, therefore, Impatience may be inferred as a co-relative trait.]

He nestles to the breast of his keeper and clasps him round the neck and body. [Seemingly he thus demonstrates affection; but it should be borne in mind that young monkeys embrace their parents in this way for protection and for transportation. He has been noticed to make the movement with the eagerness of anticipated pleasure. It may be supposed that during the process of evolution, this close bodily union would, from associated conditions in the organism and

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* Cf. "Mental Evolution in Animals," by George John Romanes, M.A., LL.D., F.R.S.

its environment, give birth to and become welded with feelings of large mass and momentum; and possibly, I think probably, here may be discerned one of the utilitarian origins of embracing as a mode of expressing strong attachment among ourselves.]

An opportunity was now given to observe the facial, and other outward signs, of a general feeling of Pleasure, compounded of voluminous simple-sensation—pleasure, the pleasure of play, and perhaps the pleasure attending requital of affection.

Taking the chimpanzee upon his knees the keeper tickled him about the armpits and playfully fondled him.

Moderate enjoyment was manifested by a slight parting of the lips and opening of the mouth, and by quick movements of the limbs and trunk in flexion. Stronger feeling by a broad grin, displaying both rows of teeth—the mouth widely open—and by moderately loud, low-pitched chuckles; closely simulating the vocal elements of human laughter. The excitations of the *risorii* and *zygomatici*, especially the latter, are well-marked; the angles of the mouth being drawn outwards and conspicuously upwards. [The observation above, respecting the exposure of teeth, slightly conflicts with an observation of Mr. Darwin. He remarks:* "The teeth in the upper jaw of the chimpanzee are not exposed when they utter their laughing noise, in which respect they differ from us." Repeated examination established the facts that in laughter of moderate degree, only the teeth of the lower jaw are uncovered; but in laughter of considerable intensity the teeth of both lower and upper jaws are well exposed.

It was not observed as a result of the experiment recorded, nor subsequently, that the eyes and the muscles about the orbits gave any recognizable indications of the inward feeling. These parts of the face are generally expressionless. During laughter the eyes are perhaps less immobile than usual, but the eye-lids are quite open, there is no perceptible lachrymation, and the face is not suffused with blood. The naso-labial fold of infantile and adult laughter is plainly marked. When the volume of pleasurable sensation is small, the lips are separated with an expression that may properly be called a smile.

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* "The Expression of the Emotions in Man and Animals," page 133. Appleton & Co., New York, 1873.

In the chimpanzee then the outward and visible signs of laughter are comparatively simple. Still, it was demonstrated that the energy set free seeks escape not only along some of the same tracks of neuro-muscular tissue as in simple laughter in man, but that a relation, as in man, subsists between proportions of liberated energy and particular avenues of outlet. If the quantity of feeling is small, the lines of discharge terminate in labial muscles—the lines made most permeable by constant use; if the quantity is large, the labial muscles become more strongly contracted, and the energy overflows through respiratory, vocal, and voluntary neuro-muscular systems. The contractions of voluntary muscles, however, in the instance related, are not considerably of central origin, but are in larger measure reflexes from the cutaneous periphery.

That species of laughter which is caused by the perception of certain incongruities,* as a clown in female clothing, a parrot uttering oracular speeches, was never witnessed in the chimpanzee, though two or three attempts were made to evoke this kind of risibility. The facts of comparative psychology and the doctrine of evolution would invite expectation of these negative results. A true sense of the ridiculous,† the laugh of scorn—derision, the ironical laugh, the smile of pity, are specialized differentia of the expression under examination, and their evolution would be contemporaneous with the unfolding of a higher grade of cognitive faculty than is found in any of the lower animals.

The resemblance between the physiognomic language of laughter due to simple-sense pleasure, and the physiognomic language of anger, is, as succeeding notes will show, very striking; especially is it so when we consider the apparent antithesis of the subjective accompaniments. Sometimes the resemblance makes it doubtful whether the chimpanzee is pleased or displeased. In both cases the mouth may be open, its corners retracted, and the teeth exposed. And there are many other likenesses quite deserving of exhaustive consideration from the standpoints of physiology and evolution.]

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*See Herbert Spencer's essay "The Physiology of Laughter."

† Not a sensitiveness to ridicule, which dogs and monkeys manifest.

We were afterwards to note the chimpanzee's behavior under a feeling of Displeasure with Disappointment as one of the root-elements.

A piece of banana, of which fruit he is very fond, was offered him by his keeper through the bars of the cage, and withdrawn as he approached to receive it. At first he sulked with pouted lips, and then uttered prolonged squeaks, drawing the upper lip tensely over the upper row of teeth. As the keeper essayed to go away with the banana, he became angry, crying with mouth widely open and the angles drawn outwards. Both rows of teeth were exposed. He next retired from the front of the cage, and standing upright with his back to one side of it violently shook the hands, after the manner of very young children under similar circumstances.

The banana being given to him, the face assumed a contented but placid expression.

In putting the banana through the bars of the cage, a small piece of the fruit was left upon the outside of an external wire netting, and to obtain this piece the right fore-finger and prehensile lips were employed with nicest co-ordination of action. He clears his nostrils by scooping in the cavities with the tip of the fore-finger.

October 1st, 1884.—To-day the chimpanzee is less vivacious and is disinclined to indulge us in our wishes to elicit his mental qualities. When an attempt is made by the keeper to incite him to jealousy, by nursing with assumed tenderness and affection a monkey (*Cercopithecus griseo-viridis*) which has just died, he looks on with stolid indifference. The dead monkey being placed within his reach he examines it with an intelligent but silent scrutiny. Evidently he recognizes the monkey as one of his kind, and in doing so he employs the sense of smell as well as the sense of sight; but he thinks it is sleeping, for he tries to arouse it by pressing his knuckles into its flesh and by pulling its hair. If he has a distinct perception that the monkey is dead, this perception is without strong emotional associations, inasmuch as he comports himself with perfect impassivity; for assuming, without the warrant of fact, his ability to control the signs of feeling, there was not in the occasion any motive for concealment of feeling.

A little dog is placed not quite within his reach. He observes it with a quiet air, touching it with his fingers. Seizing a change to grasp it, he squeezes one of its limbs between his finger and thumb, betraying the accompanying feeling by firm compression of the lips—contraction of the orbicularis oris.

[We ourselves compress the lips in this way under various kindred emotions. Generally these emotions are counterparts of organismal actions determined by resistances in the environment, or cognized as resistances. There may be instanced the features in determination, implacability, hostility, incipient anger, and the firm closure of the lips in some people when thinking laboriously. In these cases the physiological condition is an energizing of the higher parts of the brain to overcome opposing forces, and this naturally expresses itself, in general, by muscular tension. In converse cases, where the cognition is of neutral or attractive forces, muscles are relaxed; as we see in ease, contentment, the smile of pleasure, the look of love, the attitude of devotion.]

October 3d, 1884.—A kitten was put in the cage with the chimpanzee. He took it up playfully and held it at first with much gentleness and even tenderness, but afterwards took it by the tail and swung it round several times. He then carried it across the cage, swinging it by one of its limbs, at the same time grinning, the mouth being open and the teeth exposed, with a cruel and wanton expression of countenance. The kitten was then taken from him. It was not positively observed whether the teeth of both upper and lower jaws were uncovered.

[We are reminded by the foregoing incident of the behavior towards dumb creatures of children before the growth of the sympathies. Babies and very young children are wont to seize kittens and puppies by an ear, a limb, or the tail; and it is not until there is some mental representation of the suffering thus caused and the danger incurred of being bitten or scratched, that animals are handled with gentleness and care.

That tender emotions are experienced may be inferred from the fact that he pressed the kitten to his breast and kissed it, holding it very gently in both hands. In kissing, the lips are pouted and the tongue protruded, and both are pressed upon the object of affection. The act is not accompanied by any sound, thus differing from ordinary human osculation.

The smile of cruelty we may interpret, from the evolution point of view, as the facial index of feelings arising from the exercise of consciously superior power.*]

When matches were lighted before him, at the moment of ignition he started back, spasmodically closing the eyelids. Curiosity as to the nature of the light led him to put his finger in the flame, and then place his finger to his nostrils. He burnt his finger slightly and placed it for a moment between his lips in contact with the teeth and tongue.

We now watched the effect of introducing him to his reflection in a large mirror.

Peering round the edge of the glass, he perceived his image, and remained for a second fixed with surprise. He then looked to the back of the mirror, and began to bite the frame and pull an attached cord as if in anger. Advancing to the front and examining the reflection of his person with evident satisfaction, he commenced, with absurdly sincere intentions, to make effusive demonstrations of love. He repeatedly pressed his lips and tongue to the glass, and erecting himself to his full height, strutted, and grinned, and made obeisance in most ridiculous and amusing fashion. He was once seen to make signs to his image by spasmodic movements of the lips, without uttering any audible sound. He again looked behind the mirror, and again fell to biting the frame. He became still more angry, and hit the glass, first with the left fore-hand and then with the left hind-hand, and continued to do so with such violence that we were finally compelled to break the spell.

While eating some fruit he saw himself in the glass, and ran away precipitately that he might keep possession of his morsel. [This rather trite experiment serves to show us the simplicity of his processes of Recognition. They are not marked perspicuously by the conscious comparison of relations, but partake somewhat of the nature of instincts in being relatively implastic. It is true that he looked behind the mirror, but he did so, I think, from a desire for contact with the supposed monkey, and not to verify visual perceptions by actual perceptions; for the complete contradictory evidence from the latter source did not in any noticeable degree modify the precept derived from the former: he continued to be satisfied of the validity of his first cognition.

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* Cf. Mind; "A Classification of Feelings," by C. Mercier, M.B., July, 1884.

His violence towards the mirror may be construed as the outcome of unsatisfied desire, or as active resentment towards an offending object; and in the latter case recalls the instinctive disposition in some children to vent spleen upon inanimate things through which they have sustained hurt.]

Additional and check observations were made of the chimpanzee's conduct under antagonistic feeling. A portion of an orange, the paring of which he had eagerly watched, was placed in a cigar box by his keeper, instead of being handed to him according to his anticipation. He thereupon gave forth a faint, whining, murmuring cry, his head was depressed, i.e., flexed upon the thorax, his eyes were sullen in expression, and his lips forwardly pouted, and he retreated from us. On a like occasion the interesting fact was noted that he sought solitude under a table, turning his back towards us, with head to the ground.

The experiment was repeated, with this modification, that in place of the keeper I was the person withholding the piece of fruit. Now he screamed loudly; the mouth was opened, its angles retracted, and both rows of teeth uncovered. The hands were shaken vigorously; the entire ebullition of feeling being highly suggestive of, and, indeed, only to be adequately described by reference to the crying of an infant.

The piece of fruit was withheld from him a third time, again by me, and to the effect that he gave way to a fit of anger, passing into fury. He grinned with savage looks, danced about, stamping his feet, and with his hands cast upon me the saw-dust from the floor of the cage.

[Here we have, evolutionally considered, three distinct modes of opposition to counter-forces in the environment. As suggested by the very important classification of feelings recently discovered by Dr. Charles Mercier ("Mind," loc. cit.) the first-described form is a passive antagonism—sulkiness; the second, active-passive—crying with vexation; and the third, active—anger and rage. But though these three varieties of feeling had the distinctive characters described, stages of transition from one to the other were noticed when the provoking influences underwent changes of amplitude.

Three or four observations lent support to, but did not quite confirm, the opinion that the chimpanzee's sulkiness is a passive protest against an unfriendly act of one to whom he is bound by ties of affection, or one from whom he is wont to receive favors, and therefore cannot actively resist. He was more inclined to be sulky or sullen when the fruit was refused him by his keeper than when refused him by others. He did, however, exhibit vexation or annoyance when the keeper showed much persistency, and on later dates cried when opposed by him; but crying is not retaliatory. It would seem, therefore, that wounded-feeling is one of the constituents of sulkiness, and gives to it the quality of passiveness. These suppositions are strengthened when we consider that one of the essential conditions of sulkiness in other cases, is some degree of social union and social concord. We may be angry, contemptuous, or timorous towards an enemy, or a rival, but not sulky.

The movement of the body *away* from the offending person, and the turning of the back to him, with depression of the head, are clearly anti-social in meaning, and were present, more or less markedly, with every exhibition of sulkiness. That the chimpanzee should seek solitude, as mentioned above, is very interesting when we bear in mind the etymology of our words sullen, and, probably, sulky: O. Eng., *solein*, *solain*, lonely, sullen; Lat., *solus*, alone. Why are the lips pouted in sulkiness? If the foregoing inference concerning the composition of this state of mind be true, namely, that one of its components is disappointed affection, it seems not inconsistent with the principle that nervous energy tends to discharge itself through familiar channels, that the special and complex feeling originated should express itself as tender emotion is expressed, by pouted lips. Mr. Darwin thinks, and arrays numerous and cogent facts as the ground of his opinion, that the pouted or tubular conformation of lips is assumed for the production of the whining noise generally accompanying displays of sulkiness. And unquestionably this is partly the explanation, but not, I think, wholly. As negatively supporting the view here put forth, I have heard the chimpanzee make the same whining sound with the crying expression of face; and as positively supporting it, it may be stated that children sometimes pout in shyness, a state of mind *sui generis* in its dependence upon a social relation of special quality. In all probability two or more co-operative causes have been at work in the evolution of pouting as an emotional expression.

Special attention was given to ascertaining whether tears are excreted in crying. I cannot assert that there is *no* increase in the lachyrmal secretion, but an easily observable increase does certainly not take place. The eyes are not closed as in children, and therefore one of the causes of shedding tears in crying is absent. As many are aware, infants of very tender years, less than two to four months old, cry without weeping. Mr. Darwin says of his own determination of the point, "I first noticed this fact from having accidentally brushed with the cuff of my coat the open eye of one of my infants when seventy-seven days old, causing the eye to water freely; and though the child screamed violently the other eye remained dry, or was only slightly suffused with tears." To the evolutionist this tearless crying of infants and chimpanzees is a coincidence of facts of considerable interest.

When young children cry the mouth takes a somewhat square outline from the angular portions of the lower lip being drawn downwards by the *depressores anguli oris*, and from the same portions of the upper lip being drawn upwards by the *levatores anguli oris* and *zygomatici*. As Mr. Darwin quotes of a child that was fed while crying, "it made its mouth like a square and let the porridge run out at all four corners."

This contraction of the *depressores anguli oris*, the chimpanzee when crying does not display in common with children, so that the mouth has not the squarish form; the angles of the mouth are drawn simply outwards and upwards. Twitching of the depressor muscles and sobbing usually terminate a fit of crying in older children. Infants do not sob. In the case of the chimpanzee the fit ends according to the incident conditions, abruptly, or with pettish whining. The quick, short, spasmodic inspirations succeeding the prolonged expirations of infantile crying, though looked for, were not seen.

The superior varieties of mankind seldom cry or weep; and in all likelihood the power to control the signs of suffering has been acquired quite recently in the history of the order Bimana. Some savages cry in the manner and from the causes prevailing among children. In certain disorders and diseases of the nervous system, as temporary depression of the vital powers from whatever cause arising, debility, paralysis, and cerebral softening, tears are drawn with pitiful readiness. And "weeping is common in the insane, even after complete fatuity has been reached and the power of speech lost." These facts are supremely interesting from the standpoint of the complementary doctrine to Evolution—the doctrine of Dissolution. The latter embodies the truth that, if the conditions are favorable, the unbuilding of the organism by the destructive agencies of its conditions, is in the opposite order of its building during the vast cycles of evolution; and also implicates, as an accessory, the truth that the later evolved functional and structural attributes of the mind and body, are less stable or enduring than those antecedently evolved. By the illumination of this conception we are enabled to understand why the mental capacities by means of which the expressions of pathetic feeling are suppressed—possessions won by the race but as yesterday—are insecure and fleeting as compared with the capacities for showing suffering, which were organized probably during inconceivably remote eras. Further, speech, which is but the "language of the emotions" elaborated, appeared during evolution later than this language, as the chimpanzee eloquently testifies, and disappears, during dissolution, sooner, as the insane so pathetically testify.

In connection with the principle of dissolution it may be mentioned that during convalescence from an illness from which the chimpanzee suffered at a later date, there was, as we observe in ourselves under like conditions, loss of control over aggressive feeling.

When very angry the chimpanzee will sometimes throw himself upon the abdomen, throw his arms wildly about, strike the floor, and bite those who touch him, just as children often do. The ears are expressionless in anger as in other emotions; but, having attended to the point with some care, I can affirm, contrary to the observations of others, that the pinnæ do move slightly as a whole, as if from contraction of their intrinsic muscles and not from tremor of their flexible cartilages. The face is not distinctly reddened.

If we contrast crying and anger in the case of our subject, with crying and anger in the case of children, we find, as we found in laughter, that the anthropoid emotions are characterized by greater homogeneity, simplicity, and indefiniteness, in harmony with evolutionary truth.]

October 7th, 1884.—A colored india-rubber ball, making a musical note when the contained air was expelled, was shown to him, and the sound produced. He started away, looking a little alarmed, and then advanced and visually examined the object with an air of curiosity. When the ball was given to him to play with he was evidently doubtful of its harmlessness, and touched it rather gingerly, rolling it about the cage. At length he took the ball in his hands, not seeming afraid, and tried by gentle pressure, in imperfect imitation of what he had seen me do, to evoke its note. Failing in this, he commenced to hit it forcibly with the knuckles, and grinned with pleasure when the sound was produced. He then hit it violently, drawing the upper lip over the upper row of teeth, looking as if delighted in the exercise of his powers.

He was allowed to see a piece of fruit put in a tin box or canister, and the latter closed by a firm adjustment of the lid. He very quickly applied the teeth, not the fingers, to remove the lid, and having succeeded in doing so, extracted the fruit. But seeing a similar cover on the opposite end of the canister the previous association of contiguity between an adjusted cover and enclosed fruit, forced him unreasoningly to remove this cover also.

A pretence was made of putting the fruit in the box, the lid being applied as before. When he found that the box was empty his face assumed a very comical blank look of checked expectancy. The hand was inserted three or four times into the box and the latter held in position for ocular inspection. He then took off the remaining cover and, still unconvinced that there was no fruit, held the canister to his eyes, spying through it from end to end, and repeated this action more than once. [It is worth while marking the fixedness of the animal's prepossession. The pleasing belief that there was fruit in the box, for a time rendered cognitions from the most trustworthy senses—impressions entirely inoperative in the formation of a new conviction.]

When trying to extract the piece of fruit by inserting the hand, which the box was just large enough to admit, the lips were slightly compressed, as we compress our lips in acts necessitating nicety of muscular adjustment—for example, learning to write, untying a knot, etc. Attention has been drawn to a general quality, or condition of the correspondence between the organism and its environment required to call out this expression

October 13th, 1884.—A painted terrapin (*clemmys picta*) was placed in the cage with the chimpanzee. He stood on all fours at a distance of several feet from it, and eyed it with strained and fearful attention. The mouth was a little open, the teeth were not exposed. The upper lip twitched spasmodically, probably from contractions of the *levator labii superioris* and *zygomaticus minor.* As the reptile crawled away from him, he followed it, throwing saw-dust with the fore-hand, and stamping with the hind limbs as if to frighten his enemy. When the terrapin turned towards him he retired looking terrified. The face wore a distressed, not very definable, expression of extreme fear, and the hair over the entire body stood on end, falling again as the space increased between himself and the object of his terror, or as the supposed maleficent agent assumed an apparently less aggressive attitude. When Mr. Cook held the monkey with one hand, and the tortoise with the other, the former struggled actively to escape, and succeeding, sought security near the roof of the cage.

When the tortoise was taken away altogether, the chimpanzee sat upon a table breathing hurriedly; the limbs and features were visibly relaxed, the assemblage of signs being very expressive of Relief—the removal from consciousness of something perceived as imminently harmful. Dr. Conklin thought the face was paler than during the period of excitement, and I am inclined to corroborate the observation. Under changed circumstances, the terrapin and other harmless (though apparently to the chimpanzee harmful), animals were placed within his immediate environment. As noteworthy additional results, may be mentioned the studied caution with which he ventured upon a more intimate acquaintance with the fear-inspiring creatures. On one occasion, before touching the terrapin with one hand, he took the sagacious *pre*caution to hold open with the other hand the swinging door of his cage, that if necessary he might obtain safety within.

Nothing could more decisively demonstrate than these experiments the existence of natural inalienable affinities among Feelings, their insensible gradation one into the other, and the dependence of every grade upon quantitative and qualitative relations between the organism and the external world. When the terrapin or other animal was cognized as overwhelmingly maleficent, the outward signs were those of Terror; when cognized as simply dangerous, Fear and Timidity were the expressed emotions; when as possibly harmless, Confidence, Courage and Boldness were shown; when as certainly harmless and of insignificant power, there was manifested Cruelty; and when as attractive or beneficent—as in the case of a tame white rat—there was witnessed an exhibition of Tender Feeling.

October 15, 1884.—A child's harmonica was played before the bars of the cage and attracted his close attention. The instrument was given to him, and he at once placed it between his teeth in proper position for producing the sound, but afterwards in the wrong position. He now took the harmonica in his hands, examined it and shook it as if wishing to find out its nature. He knocked it upon the floor and hit it with his knuckles. When Mr. Cook played an air the chimpanzee was strongly influenced. He smiled broadly, the angles of the mouth being well raised, and patted his keeper upon the head with both hands, as if in the fullness of pleasure. He also applied his lips to the instrument. The rather surprising intensity of feeling shown may possibly be related to the feverishness from which the chimpanzee is suffering to-day, slight felicitousness being a common concomitant of the febrile state.

October 21, 1884.—A living monkey (*Cercopithecus cephus*) was held by Mr. Cook before the cage. The chimpanzee's upper lip became firmly compressed and pointed at the septum, with deep corrugations running from the latter feature outwards and upwards to the zygoma. He extended his hand and pulled the hair of the monkey's neck. The monkey attempted to bite him and squealed loudly. This appeared to make the chimpanzee angry. He hit the monkey, his face wearing a savage expression. He then made friendly overtures, patting the head of the monkey, pouting the lips as if wishing to kiss, and squeezing one of the monkey's feet between his teeth. The monkey resisted, with snarls and screams, and the chimpanzee then tried to beat it with the left hand, as if administering a merited punishment. This not availing as a corrective measure, he exposed his teeth, raising the upper lip and also the nose, after the manner of carnivora when they are enraged. This, I think, was done with the express intention of cowing the monkey, for he began to throw his arms about very wildly, with all the appearance of assumed passion; and, taking up a blanket lying at his feet, shook this in the air, evidently with the cunning purpose of frightening his antagonist into submission.

(*To be continued.*)

ART. VI.—GANGRENE.*

BY JOSEPH M. SKALLY, V.S.

By gangrene is understood the death of an organ or part, as manifested by the more or less rapid breaking down and chemical decomposition of its texture. Gangrene may affect both soft and solid structures, the bones, for instance, or even fluids, as in necrosis or sepais of the blood. The breaking down of structures is generally a slow process, whilst in soft, juicy textures, and in fluids, it is rapidly consummated. Like normal textures, new formations of every kind, tumors, exudates, pus, are liable to become necrosed. Fluids degenerate through necrosis into gangrenous ichor, the most infectious and destructive of its tribe.

A general characteristic of gangrene is not easily given, so manifold are its forms, and so various are its causes. Soft parenchymata commonly breaks down into a diffluent pulp, marked by a high degree of discoloration and of fœtor. As decomposition proceeds, gases are generated in the parts, principally sulphuretted hydrogen, ammonia, nitrogen and carbonic acid. These give rise to the emphysematous crackling which is so often associated with the gangrenous processes. The tissues at the same time undergo a process of softening, or liquefaction, the limbs become exceedingly offensive, and owing to alterations in the transuded hæmoglobin, changes from a reddish color to a brownish or greenish black. The characters of the dead parts vary with its structure, its vascularity, the cause of the gangrene, the acuteness of the process, and the possibility of the access of atmospheric air. The more vascular the part, the softer the structure, and the more it is exposed to the atmosphere, the more rapidly and completely does it undergo decomposition. Bones, cartilages, and tendons, which are firm, hard tissues, containing comparatively but few vessels, undergo very little alteration in structure and form; whereas softer parts are much more rapidly and completely destroyed. The occurrence of decomposition manifests itself in the first place in the blood contained in the part. The hæmoglobin escapes from the red blood corpuscles, partly by exudation, and partly by the destruction of the corpuscles themselves, and dissolved in the liquor sanguinea, permeates the surrounding tissues. The corpuscles are ultimately completely annihilated, nothing remaining but a few minute granules. The staining of the tissues with the hæmoglobin is known as *post mortem* staining, and the appearances it presents are very characteristic. All the tissues may be more or less affected, but the lining membranes of the heart and large blood-vessels, being in immediate contact with the blood after death, are naturally more so than other parts. The staining is of a uniform pinkish red color, thus differing from the puncti-form and strati-form redness of hyperæmia, from which it must be carefully distinguished. The amount of staining is in proportion to the rapidity with which the decomposition has taken place, and to the amount of blood contained in the part at the time of death. Gangrene has the import sometimes of a local, sometimes a symptom of general disease. The conditions necessary to the former case are nearly reducible to arrested afflux of blood—that is, stasis. It may begin by attacking fluid parts, and especially the blood, and extend from them to solid structures, or it may affect them all at once.

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* Read before the Massachusetts Veterinary Medical Association, October 1st, 1884.

DEVELOPMENT OF GANGRENE.

Gangrene is developed,

First.—Out of absolute blood stasis, which may occur under various circumstances.

(a). Every hyperæmia in organs, or sections of organs, particularly in paralyzed or enfeebled, or obnoxious to debilitating influences may degenerate into absolute stasis. This applies particularly to asthenic, hypostatic, hyperæmia in torpid peripherous organs, vegetating, so to say, imperfectly under the embarrassment of continued pressure.

(b). Mechanical hyperæmia frequently becomes absolute stasis as seen in incarcerated, strangulated organs, and as a result of the plugging of the returning vessels in the lower extremities.

(c). Every inflammatory stasis may degenerate into absolute stasis, more particularly those hypostatic and asthenic inflammations which occur in organs already diseased, paralyzed or depressed by violent external influences, such as concussion, contusion, heat or cold. An inflammation consequent upon influences directly or indirectly debilitating, may acquire during its progress, a tendency to absolute stasis. In absolute stasis, the blood undergoes gangrenous decomposition. Hence, the blood is the portion originally necrosed and dissolved. It exudes in a state of gangrenous ichors through the walls of the blood-vessels, causing the same gangrenous decomposition in these and in the surrounding tissues. This event gives rise to the most ordinary, and most developed form of moist gangrene. The progress of this gangrene is more or less acute, the gangrenous dissolution of tissues being marked by the rapidity of its course.

Second.—Gangrene is determined by failure in supply of blood.

(a). In impermeability of large arteries--high degree of calcification, and complete obstruction consequent upon arteritis and ossification.

Here gangrene takes the form of dry, black mummyfying gangrene.

(b). As a result of compression and tension of a part—as in strangulated hernia.

(c). As a result of local destruction of blood-vessels, the denudation of parts of attaching and blood supplying textures—bones, for example, of their external and internal periosteum, the common integuments of their supporting areolar tissue, the peritoneum of its subjacent layers, isolation of the pleura-pulmonalis over cavities of the lung. This gangrene appears as a white or yellowish-white slough.

(d). Extensive impermeability of the capillaries and minute vessels when plugged with coagula or compressed by surrounding exudates. In the last mentioned case, the gangrene is dependent upon inflammation. In this kind of gangrene, textures poor in blood-vessels, such as compact bones, callosities, etc., especially if brought into stasis or into coagulation, possess, in common with the exudates thrown out by it, an inherent tendency to gangrenous dissolution. It has already been stated that several varieties of gangrene have been recognized.

Third.—(1). Gangrene developed out of an internal cause is distinguished by the designation of primary gangrene, from that arising from an external cause.

(2). Hot, acute inflammatory gangrene, true gangrene, in the manner which inflammation leads to gangrene, is sufficiently clear from the foregoing.

(a). The inflammatory stasis, owing to its very intensity, to pre-existing debility of the diseased textures, or lastly to weakening influences caused during its progress, degenerated into absolute stasis.

(b). It occasions gangrene by the crushing effects of its products upon the capillaries, or by mechanical or ulcerous isolation of the textural parts. In this way gangrene may arise in tissues laboring under the sequelae of inflammation, without itself being an issue of the latter.

(3). Cold gangrene, sphacelus. This form is not in any way connected with inflammation.

Fourth.—Moist gangrene comprises the breaking down of fluid substances to gangrenous ichors and of fibrous textures to a various colored diffluent pulp, marked by the evolution of fœtid gases. It is the gangrene developed out of absolute blood stasis; therefore, again inflammatory gangrene. It may be compared to the decomposition of animal matter under the co-operating influence of water.

Fifth.—Dry mummyfying and senile gangrene are the various terms designating this form of gangrene, which is caused by a deficient supply of blood. It manifests itself in the perishing of the implicated structures, with shrivelling or withering thereof to an incipiently tough, but eventually sloughing mass. Often, and particularly in the extremities, owing to impermeability of their arteries, the gangrenous textures blacken; as such it is comparable to the decaying of organic matter with an insufficiency of moisture, and with the disengaging of pure carbon.

Sixth.—Black gangrene—gangrenous slough.

Seventh.—White gangrene occurs, for the most part, as a result of pressure in incarceration of the denuding of membranous expansions of their subjacent textures; for example, as peritoneal sloughing at the base of intestinal ulcers. Of these different varieties of gangrene several are often present at the same time. Beneath the common integuments, often transformed into a swarthy, parched rind in senile gangrene, we often meet with patches of tissue which are reduced to humid, stinking pulp. Just as in gangrene of solids, gangrenous slough varies, so in like manner does gangrenous ichor, as necrosed blood or exudates vary, according to the crasis or constitution under which either has become attacked with gangrene. Like normal textures, diseased textures and new growths, fibroid, cancerous formations, for example, may become a prey to gangrene. Neither to ulceration or gangrene are all textures alike obnoxious. Bony, elastic, fibrous textures resist gangrene more ably than muscle. Areolar tissue, or mucous membrane, lax embryonic textures; like certain varieties of cancer, are especially prone to gangrenous destruction. The constituent elements of gangrenous texture masses are more or less well preserved textural debris, larger or smaller black contoured molecules, down to pulverulent granular mass, black pigment granules, fat drops and crystals. Contact with the atmosphere is by no means indispensable to the generation of gangrene. It affects equally with the external parts, organs never in contact with the air—as the liver and spleen. A very important phenomenon, involving a curative act, is the circumscription of gangrene by an inflammatory process of ulcerative isolation of this gangrenous part through its own secretion. The ultimate healing is brought about by the same inflammatory process changing to one of pus production and of regeneration. The organs most liable to be affected with gangrene in our practice (veterinary) are as follows, viz.: Peritoneum, stomach, intestine, liver, spleen, bladder, air passages, pleura, lungs, heart, vagina and uterus, penis, tongue, and bones. Of this last I shall not treat, leaving it to be disposed of under the common term applied to the disease, viz.: Necrosis of bone.

Gangrene of the peritoneum in the horse generally results from dividing the cord too high up, causing a high degree of erysipelatous fever, which usually extends to the peritoneum, which, along with the cord and surrounding structures, speedily becomes gangrenous. It may also be caused by pressure, as in hernia.

Stomach.--This is liable to become gangrenous through the introduction into it of the various acids in an undiluted state, and of the various caustic alkalies given in large doses by persons who are ignorant of their specific action. In reference to the intensity of the effect which may cause superficial or deep mortification of the tissues with greater or less rapidity, we distinguish several degrees. The effect is influenced by the quantity and the strength of the liquid and the duration of the period during which it remains in contact with the parts alluded to. We generally find the effect to be less intense in the cavity of the mouth and fauces, more marked in the œsophagus, and most powerful in the stomach. The entire mucous membrane is destroyed and converted into a black, soft mass, which is distended by a sanguinous fluid, and is easily detached from the muscular coats.

Intestines.—We find these affected by gangrene as a sequel to enteritis and intussusception, but as all these cases will prove fatal, I shall not dwell longer on them.

Liver.—Gangrene of this organ is of a very rare occurrence, but it is sometimes found associated with pulmonary gangrene. It is developed in parts affected with inflammation and suppuration. It occurs in more or less circumscribed spots, in which the paranchyma is dissolved into a brownish-black-green pulp, which diffuses the characteristic odor of sphacelus. We find suppuration in the vicinity, which is a product of reactive inflammation, and which defines the boundaries of the mortified parts.

Spleen.—Gangrene of the spleen is of as rare occurrence as the liver.

Air passages.—This affection occurs both here and in the parenchyma of the lung in two distinct forms, either as a circumscribed eschar on the mucous membrane, eating its way into the submucous tissue, in which it may occur primarily or as a diffuse gangrenous colliquescence of the bronchial mucous membrane. The conditions under which it is developed are similar to gangrene of the lung, with which it is sometimes combined. It generally, however, occurs in tissues in some way previously diseased, but appears rather as an accidental termination than as a necessary consequence of any peculiar local morbid process. It is most commonly associated with pulmonary gangrene.

Pleura.—Gangrene of the pleura occurs in consequence of its being denuded by accumulations of pus or ichor in the costal or pulmonary wall. The pleura then assumes the appearance of a yellowish-white, or more frequently of a blackish or greenish-brown lax or deliquescent slough, with superficial gangrene of the lung.

Lung.—Gangrene of the lungs is an affection of not infrequent occurrence, and under certain hepatization of a portion of a lung is a most common complication.

There are two distinct forms of gangrene of the lungs, viz.: diffuse and circumscribed or gangrenous eschar. In diffuse gangrene we find a portion of the lung presenting an abnormal greenish or brownish tint, filled with a similar colored, somewhat fatty, turbid serosity, soft, rotten, and breaking readily down, into a pulpy, shaggy tissue. The whole evolves the characteristic odor of sphacelus. Towards the outer portion the discoloration, infiltration and alteration of consistence are less marked, and finally become imperceptible, and there is no line of demarcation between the gangrenous and the adjacent tissue, which only differs from the normal state in being œdematous and ænemic. It corresponds to diffuse gangrene of the bronchial tubes, with which it is almost always associated. Upon the whole it is a rare affection, but when it does occur it always attains a considerable extent, as it commonly attacks one or more lobes. It is, perhaps, scarcely entitled to rank as an independent affection, as it is generally associated with eschar of the lungs, and hence it is more readily developed from the contact of the ichorous, gaseous and fluid products of the gangrenous eschar coming in contact with the bronchial and pulmonary mucous membrane, inasmuch as in all probability the disease extends from the bronchi to the lung tissue. The foregoing description of gangrene as it occurs in the upper lobes is sufficient to render this form intelligible, as well as to explain why there is no inflammatory reaction, and consequently no line of demarcation around the affected tissue. This form of gangrene very often follows as a sequel to fibrinous pneumonia. Circumscribed or partial gangrene of the lungs appears in the form of gangrenous eschar, and is more frequent than the former variety. We find the parenchyma at some spot of varying size converted into a blackish or brownish-green, hard but moist eschar, which adheres to the surrounding tissues, and evolving the peculiar odor of sphacelus, and similar to the eschar produced on the skin by nitrate of silver. It is sharply defined, and becomes gradually loosened from the surrounding tissues, and rests in a cavity corresponding to it in size and form. It may be described as a blackish-green plug, which is soft on the surface, with a firm centre floating in an ichorous fluid. More frequently the greater portion of the eschar softens and becomes dissolved into a greenish-brown fœtid ichorous pulp, mixed with rotten, shaggy fragments of tissue, and enclosed in a cavity, whose walls are lined by a shaggy tissue, infiltrated with ichor. These eschars may either occur singly, or several may be present. If the gangrenous eschar becomes detached it falls into the cavity of the thorax unless there be firm adhesions at the spot, or else it becomes dissolved, and the ichorous semi-solid matter is effused into the pleural sac, and gives rise to pleurisy with ichorous exudation, and to pneumothorax, since the fœtid gas evolved from the gangrenous mass either collects alone in the thorax, or atmospheric air finds its way out through the bronchial tubes which opens into the abscess, and thus mixes with the aforesaid gas in the thorax. Partial gangrene often arises in the perfectly healthy lungs of weak, decrepit and cachetic animals from general depressing influences, and is developed from a circumscribed passive stasis. Under simular circumstances we find it associated with pneumonia in its various stages, with pulmonary abscesses, with tuberculosis, with bronchitis, or it may be caused by the absorption of gangrenous ichor from gangrene of different parts into the blood.

Heart.—There is nothing at variance with the possibility of the occurrence of gangrene in the muscular substance of the heart. Ulcerations accompanied with malignant products are not of rare occurrence, but the correctness of the observations purporting to refer to gangrene of the heart have nevertheless been called in question by several writers; and we must remark that no case of the kind ever came under our notice.

Uterus.—We sometimes find gangrene of the uterus, resulting from inversion, causing a gradual compression of the veins, the vessels become engorged with blood admitted to them faster than it can leave them, and so after intense congestion mortification ensues.

Penis.—We also meet with gangrene of the penis, resulting from paraphymosis or strangulation of the glans penis.

Tongue.—The point of this organ is, in rare cases, found in a gangrenous condition caused generally by the administration of some caustic irritant, such as turpentine, potash, etc., also by the pressure of the halter rope in leading, when it is passed through the mouth, enclosing the tongue.

When mortification has a tendency to spread, its dark color is gradually lost in the surrounding tissue, whereas, when it ceases to spread, a red line, called the line of demarcation, separates the dead from the living tissue. This line is always regarded as most important, indicating that sloughing has ceased to spread and that a process has begun for the removal of the sphacelated mass from the system. The final act in the separation of dead tissue is that of ulceration of portions of living tissue which are in immediate contact with the dead. A groove is formed by this ulceration which circumscribes and entrenches the dead part, and then gradually deepening and converging, undermines it until it reaches the centre, when the separation is complete and the slough falls off or is dislodged.

By the discharge of the ulcerated living tissue concomitant with this process of destruction one of repair is set up. As the ulcerated groove deepens so do granulation cells rise from its surface, so that one might say that which yesterday was ulcerating is granulating to-day, and thus very soon after the slough has separated the whole surface of the living part from which it was detached is covered with granulation and proceeds like an ordinary ulcer towards healing.

ART. VII.—THE LIFE-WORK OF PASTEUR.*

BY HIS SON-IN-LAW.

Louis Pasteur passed his childhood in a small tannery which his father had bought in the city of Arbois, in the department of the Jura, to which he removed from the ancient city of Dôle, in the same department, where he was born. When Louis became of suitable age, he was sent to the communal school, and was so proud of the fact that, though he was the smallest of the pupils, he went on the first day with his arms full of dictionaries away beyond his years. He does not appear, as yet, to have been a particularly diligent student. He was as likely to be found drawing a portrait or a sketch—and the walls of several Arboisian houses bear testimonies of his skill in this art—as studying his lesson, and to go a-hunting or a-fishing as to take the direct way to the school. Yet the principal of the college was ready to predict that it was no small school like this one, but some great royal institution, that was destined to enjoy his services as a professor. As there was no Professor of Philosophy in the college at Arbois, young Pasteur went to Besançon to continue his studies. Here, in the chemistry-class, he so vexed Professor Darlay with his frequent and searching questions, that the old gentleman was disconcerted, and declared it was his business to question the pupil, not Pasteur's to question him. Pasteur then had recourse to a pharmacist in the town who had gained some distinction in science, and took private lessons in chemistry from him. He fared better at the École Normale, where he had Balard for a teacher, and also enjoyed the instructions of

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*This "Review on the Life and Work of Pasteur" is taken from the *Popular Science Monthly* of June, 1884:

We cordially recommend the careful reading of this book to every American veterinarian. The present movements in Preventive Medicine are especially dependant upon studies of certain animal diseases and as the principal work in this important field has been done by Pasteur, it is essential that all veterinarians, students especially, should be well acquainted with his life and work, which is very clearly detailed in the volume in question.

Dumas, with whom he formed a life-long friendship at the Sorbonne.

Pasteur's first important investigation was suggested at about this time, by an observation of Mitscherlich, the German mineralogist, of a difference in the behavior toward polarized light of the crystals of paratartrate of soda and ammonia and tartrate of soda and ammonia, bodies identical in composition and external form and other properties. Pasteur discovered differences in the form of the crystals and the molecular structure of the two bodies that had escaped detection, and was led to consider that all things may be divided into two categories: those having a plane of symmetry—that is, capable of being divided so that the parts on either side of the plane of division shall be equal and identical—or symmetrical bodies; and dissymmetrical bodies, or those not capable of being so divided. Occupied with the idea that symmetry or dissymmetry in the molecular arrangement of any chemical substance must be manifested in all its properties capable of showing the quality, he persued his investigations till he reached the conclusion that an essential difference in properties as to symmetry exists between mineral and dead matter and matter in which life is in course of development, the former being symmetrical, the latter unsymmetrical.

Pasteur's wedding-day came on while he was engaged in this investigation. He went, not to the marriage-feast, but to his laboratory, and had to be sent for when all was ready.

With his observing powers quickened by his studies of symmetry and dissymmetry, Pasteur went to the researches with which his life has been identified, beginning with his studies in fermentation. Liebig's theory, that fermentation is a change undergone by nitrogenous substances under the influence of the oxygen of the air, ruled at the time, and the observations of Schwann and Cagniard-Latour on the yeast-plant were overlooked or regarded as exceptional. M. Pasteur continued the investigation of the alcohol-producing yeast-plant, and, cultivating it in suitable solutions, proved that it possessed organizing power ample to account for the phenomena. He found a similar organism—minute cells or articulations narrowly contracted in the middle—active in the lactic fermentation, capable of cultivation; and another organism, a vibrion.

full of motion, living singly or in chains, working in the butyric fermentation.

The butyric vibrion was found to work quite as vigorously and with as much effect when no air was added to the decoctions, and in fact to perish with a stoppage of the formation of butyric acid when air was too freely supplied. Reverting to the development of the yeast-plant and the alcoholic fermentation, he found that they also went on best when free air was excluded. Thus, Liebig's dictum, that fermentation is the result of the action of oxygen, must be reversed or abandoned. The organisms working these processes were given the class-name of *anœorbes*, or beings that live without air. The French Academy's impressions of the results of Pasteur's work were spoken by Dumas, who said to him, "In the infinitely little of life you have discovered a third kingdom to which belong those beings which, with all the prerogatives of animal life, have no need of air to live, and find the heat they require in the chemical decompositions they provoke around them." The place of the organisms in the economy of Nature had not yet been fixed, but Pasteur was able to declare: "Whether the progress of science makes the vibrion a plant or an animal, is no matter; it is a living being endowed with motion, that lives without air and is ferment." It would be mere repetition to follow the experiments in putrefaction, where Liebig had denied that living organisms have any place, into which Pasteur carried the same methods and obtained the same results as in the case of fermentation. He proved that living organisms have all to do with it.

After M. Pasteur had been collecting his proofs for twenty years, Dr. Bouillaud sharply asked in the Academy: "How are your microscopic organisms disposed of? What are the ferments of the ferments?" He, as well as Liebig, believed the question could not be answered. Pasteur proved, by a series of the parallel experiments of the kind that have since become familiar, that oxygen deprived of its germs is incapable of producing fermentation or putrefaction, even after years, while the same substances are acted upon at once if the germs are present; and then answered that the ferments are destroyed by a new series of organisms—*œrobes*—living in the air, and these by other ærobes in succession, until the ultimate products are oxidized. "Thus, in the destruction of what has lived, all is reduced to the simultaneous action of the three great natural phenomena—fermentation, putrefaction and slow combustion. A living being, animal or plant, or the *débris* of either, having just died, is exposed to the air. The life that has abandoned it is succeeded by life under other forms. In the superficial parts accessible to the air, the germs of the infinitely little ærobes flourish and multiply. The carbon, hydrogen and nitrogen of the organic matter are transformed, by the oxygen of the air and under the vital activity of the ærobes, into carbonic acid, the vapor of water and ammonia. The combustion continues as long as organic matter and air are present together. At the same time the superficial combustion is going on, fermentation and putrefaction are performing their work in the midst of the mass by means of the developed germs of the anærobes, which not only do not need oxygen to live, but which oxygen causes to perish. Gradually the phenomena of destruction are at last accomplished through the work of latent fermentation and slow combustion. Whatever animal or vegetable matter is in the open air or under the ground, which is always more or less impregnated with air, finally disappears. The processes can be stopped only under an extremely low temperature,.... in which the microscopic organisms cannot flourish. These facts come in to fortify the still new ideas of the part which the infinitely little play as masters of the world. If their work, always latent, were suppressed, the surface of the globe, overloaded with organic matters, would become uninhabitable."

Pasteur extended his observations to the acetic fermentation or conversion of alcohol into vinegar, in which he found an organism, the *Mycoderma aceti*, actively promoting a process of oxidation. Liebig had attributed this fermentation, also, to the presence of an albuminoid body in process of alteration, and capable of fixing oxygen. He knew of the plant called "mother," but regarded it as an outgrowth of the fermentation, and in no sense the cause. Pasteur proved by experiments that left no room for doubt—the prominent characteristic feature in all his investigations—that the plant is the real agent in producing the fermentation. He eliminated from his compositions the albuminoid matter, which Liebig had declared to be the active agent, and replaced it with crystallizable salts, alkaline phosphates, and earths; then, having added alcoholized water, slightly acidulated with acetic acid, he saw the mycoderm develop, and the alcohol change into vinegar. Having tried his experiments in the vinegar factories at Orleans, he became so sure of his position that he offered to the Academy, in one of its discussions, to cover with the mycoderm, within twenty-four hours, from a few hardly visible sowings, a surface of vinous liquid as entensive as the hall in which they were meeting.

Liebig allowed ten years to pass after Pasteur's investigations, and then published a long memoir traversing his conclusions. Pasteur visited Liebig at Munich in 1870, to discuss the matter with him. The German chemist received him courteously, but excused himself from the discussion on the ground of a recent illness. The Franco-German War came on, but as soon as it was over Pasteur invited Liebig to choose a committee of the Academy and furnish a sugared mineral liquid. He would produce in it, before them all, an alcoholic fermentation in such a way as to establish his own theory and contradict Liebig's. Liebig had referred to the process of preparing vinegar by passing diluted alcohol through wooden chips, as one in which no trace of a mycoderm could be found, but in which the chips appeared perfectly clean after each operation. It was, in fact, impossible that there should be any mycoderm, because there was nothing on which it could be fed. Pasteur replied to this: "You do not take account of the character of the water with which the alcohol is diluted. Like all common waters, even the purest, it contains ammoniacal salts and mineral matters that can feed the plants, as I have already demonstrated. You have, moreover, not carefully examined the surface of the chips with the microscope. If you had, you would have seen the little articles of the *Mycoderma aceti,* sometimes joined into an extremely thin pellicle that may be lifted off. If you will send me some chips from the factory at Munich, selected by yourself in the presence of its director, I will, after drying them quickly in a stove, show the mycoderm on their surface to a committee of the Academy charged with the determination of this debate." Liebig did not accept the challenge, but the question involved has been decided.

The experiments in fermentation led by natural steps to the debate on spontaneous generation, in which Pasteur was destined to settle a question that had interested men ever since they lived. The theory that life originates spontaneously from dead matter had strong advocates, among the most earnest of whom was M. Pouchet. He made a very clear presentment of the question at issue, saying: "The adversaries of spontaneous generation assume that the germs of microscopic beings exist in the air and are carried by it to considerable distances. Well! what will they say if I succeed in producing a generation of organized beings after an artificial air has been substituted for that of the atmosphere?" Then he proceeded with an experiment in which all his materials and vessels seemed to have been cleansed of all germs that might possibly have existed in them. In eight days a mold appeared in the infusion, which had been put boiling-hot into the boiling-hot medium. "Where did the mold come from," asked M. Pouchet, triumphantly, "if it was not spontaneously developed?" "Yes," said M. Pasteur, in the presence of an enthusiastic audience, for Paris had become greatly excited on the subject, "the experiment has been performed in an irreproachable manner as to all the points that have attracted the attention of the author; but I will show that there is one cause of error that M. Pouchet has not perceived, that he has not thought of, and no one else has thought of, which makes his experiment wholly illusory. He used mercury in his tub, without purifying it, and I will show that that was capable of collecting dust from the air and introducing it into his apparatus." Then he let a beam of light into the darkened room, and showed the air full of floating dust. He showed that the mercury had been exposed to atmospheric dust ever since it came from the mine, and was so impregnated and covered with it as to be liable to soil everything with which it came in contact. He instituted experiments similar to those of M. Pouchet, but with all the causes of error that had escaped him removed, and no life appeared. The debate, which continued through many months, and was diversified by a variety of experiments and counter-experiments, was marked by a number of dramatic passages and drew the attention of the world. M. Pasteur detected a flaw in every one of M. Pouchet's successful experiments, and followed each one with a more exact experiment of his own, which was a triumph for his position. Having shown by means of bottles of air collected from different heights in a mountain region, that the number of germs in the air diminishes with the elevation above the earth, and that air can be got free from germs and unproductive, M. Pasteur asserted decisively: "There is no circumstance now known that permits us to affirm that microscopic beings have come into the world without germs, without parents like themselves. Those who affirm it have been victims of illusions, of experiments badly made, and infected with errors which they have not been able to perceive or avoid. Spontaneous generation is a chimera." M. Flourens, Perpetual Secretary of the Academy, said: "The experiments are decisive. To have animalcules, what is necessary if spontaneous generation is real? Air and putrescible liquids. Now, M. Pasteur brings air and putrescible liquids together, and nothing comes of it. Spontaneous generation, then is not. To doubt still is not to comprehend the question." There were, however, some who still doubted, and to satisfy them M. Pasteur offered, as a final test, to show that it was possible to secure, at any point, a bottle of air containing no germs, which would, consequently, give no life. The Academy's committee approved the proposition; but M. Pouchet and his friends pleaded for delay, and finally retired from the contest.

The silk-raising industry of the South of France was threatened with ruin by a disease that was destroying the silk-worms, killing them in the egg, or at a later stage of growth. Eggs, free from the disease, were imported from other countries. The first brood flourished, but the next ones usually fell victims to the infection, and the malady spread. All usual efforts to prevent it or detect its cause having failed, a commission was appointed to make special investigations, and M. Pasteur was asked to direct them personally. He did not wish to undertake the work, because it would withdraw him from his studies of the ferments. He, moreover, had never had anything to do with silk-worms. "So much the better," said Dumas. "You know nothing about the matter, and have no ideas to interfere with those which your observations will suggest." Theories were abundant, but the most recent and best authorities agreed that the diseased worms were beset by corpuscles, visible only under the microscope. He began his investigations with the idea that these corpuscles were connected with the disease, although assurances were not wanting that they also existed in a normal condition of the silk-worm. M. Pasteur's wife and daughters, and his assistants in the normal school, associated themselves with him in the studies, and became, for the time, amateur silk-raisers. He studied the worms in every condition, and the corpuscles in every relation, for five years. He found that there were two diseases—the contagious, deadly *pébrine*, the work of the corpuscles, and *flachery*, produced by an internal organism; and "became so well acquainted with the causes of the trouble and their different manifestations that he could, at will, give *pébrine* or *flachery*. He became able to graduate the intensity of the disease, and make it appear at any day and almost at any hour." He found the means of preventing the disorders, and "restored its wealth to the desolated silk district." The cost of this precious result was a paralysis of the left side, from which he has never fully recovered.

As early as 1860 M. Pasteur expressed the hope that he might "be able to pursue his investigations far enough to prepare the way for a more profound study of the origin of diseases." Reviewing, at the conclusion of his "Studies on Beer," the principles which had directed his labors for twenty years, he wrote that the etiology of contagious diseases was, perhaps, on the eve of receiving an unexpected light. Robert Boyle had said that thorough understanding of the nature of fermentations and ferments might give the key to the explanation of many morbid phenomena. The German doctor, Traube, had in 1864 explained the ammoniacal fermentation of urine, by reference to Pasteur's theory. The English surgeon, Dr. Lister, wrote in 1874 to Pasteur that he owed to him the idea of the antiseptic treatment of wounds which he had been practicing since 1865. Professor Tyndall wrote to him, in 1876, after having read his investigations for the second time: "For the first time in the history of science we have a right to entertain the sure and certain hope that, as to epidemic diseases, medicine will shortly be delivered from empiricism and placed upon a really scientific basis. When that great day shall come, mankind will, in my opinion, recognize that it is to you that the greatest part of its gratitude is due."

The domestic animals of France and other countries had been subject to a carbuncular disease, like the malignant pustule of man, which took different forms and had different names in different species, but was evidently the same in nature. A medical commission had, between 1849 and 1852, made an investigation of it and found it transmissible by inoculation from animal to animal. Dr. Davaine and Rayer had, at the same time, found in the blood of the diseased animals minute filiform bodies, to which they paid no further attention for thirteen years, or till after Pasteur's observations on fermentation had been widely spread. Then, Davaine concluded that these corpuscles were the source of the disease. He was contradicted by MM. Jaillard and Leplat, who had inoculated various animals with matter procured from sheep and cows that had died of the disease without obtaining a development of the bodies in question. Davaine suggested that they had used the wrong matter, but they replied that they had obtained it direct from an unmistakable source. Their views were supported by the German Dr. Koch and M. Paul Bert. At this point, M. Pasteur stepped in and began experiments after methods which had served him as sure guides in his studies of twenty years. They were at once simple and delicate. "Did he wish, for example, to demonstrate that the microbe-ferment of the butyric fermentation was also the agent in decomposition? He would prepare an artificial liquid, consisting of phosphate of potash, magnesia, and sulphate of ammonia, added to the solution of fermentable matter, and in the medium thus formed would develop the microbe-ferment from a pure sowing of it. The microbe would multiply and provoke fermentation. From this liquid he would pass to a second and then to a third fermentable solution of the same composition, and so on, and would find the butyric fermentation appearing in each successively. This method had been sovereign in his studies since 1857. He now proposed to isolate the microbe of blood infected with carbuncle, cultivate it in a pure state, and study its action on animals." As he was still suffering from a partial paralysis, he employed M. Joubert to assist him and share his honors. In April, 1877, he claimed before the Academy of

Sciences that he had demonstrated, beyond the possibility of a reply, that the bacillus discovered by Davaine and Rayer in 1850 was in fact the only agent in producing the disease. It still remained to reconcile the facts adduced by Messrs. Jaillard and Leplat with this assertion. The animals which they had inoculated died, but no bacteria could be found in them. M. Paul Bert, in similar experiments, had found a disease to persist after all bacteria had been destroyed. An explanation of the discrepancy was soon found.

The bacteria of carbuncle are destroyed as soon as putrefaction sets in. The virus with which these gentlemen had experimented was taken from animals that had been dead twenty-four hours and had begun to putrefy. They had inoculated with putrefaction, and produced septicæmia instead of carbuncle. All the steps in this line of argument were established by irrefragable proof. M. Pasteur afterward had a similar controversy with some physicians of Turin, at the end of which they shrank from the test experiment he offered to go and make before them. "Remember," shortly afterward said a member of the Academy of Sciences to a member of the Academy of Medicine, who was going—in a scientific sense—to "choke" M. Pasteur, "M. Pasteur is never mistaken."

Having discovered and cultivated the microbe that produces hen-cholera, Pasteur turned his attention to the inquiry whether it would be possible to apply a vaccination to the prevention of these terrible diseases of domestic animals. He found that he could transplant the microbe of hen-cholera to an artificially prepared medium and cultivate it there, and transplant it and cultivate it again and again, to the hundredth or even the thousandth time, and it would retain its full strength—provided too long an interval was not allowed to elapse between the successive transplantations and cultures. But if several days or weeks or months passed without a renewal of the medium, the culture being all the time exposed to the action of oxygen, the infection gradually lost in intensity. A virus was produced of a strength that would make sick, but not kill. Hens were inoculated with this, and then, after having recovered from its effects, with virus of full power. It made them sick, but they recovered. A preventive of hen-cholera had been found. In the experiments upon the feasibility of applying a similar remedy to carbuncular diseases, it was necessary to ascertain whether or not animals, which had once been stricken with the disease,were exempt from liability to a second attack. The investigator was met at once by the formidable difficulty that no animals were known to have recovered from a first attack, to serve as subjects for trial. A fortunate accident in the failure of another investigator's experiment gave M. Pasteur a few cows that had survived the disease. They were inoculated with virus of the strongest intensity, and were not affected. It was demonstrated, then, that the disease would not return. M. Pasteur now cultivated an attenuated carbuncle-virus, and, having satisfied himself that vaccination with it was effective, declared himself ready for a public test-experiment. Announcing his success to his friends, he exclaimed in patriotic self-forgetfulness, "I should never have been able to console myself, if such a discovery as I and my assistants have just made had not been a French discovery!"

Twenty-four sheep, a goat and six cows were vaccinated, while twenty-five sheep and four cows were held in reserve, unvaccinated, for further experiment. After time had been given for the vaccination to produce its effect, all of the animals, sixty in number, were inoculated with undiluted virus. Forty-eight hours afterward more than two hundred persons met in the pasture to witness the effect. Twenty-one of the unvaccinated sheep and the goat were dead, and two more of the sheep were dying, while the last one died the same evening; the unvaccinated cows were suffering severely from fever and œdema. The vaccinated sheep were all well and lively, and the vaccinated cows had neither tumor nor fever of any kind, and were feeding quietly. Vaccination is now employed regularly in French pastures; five hundred thousand cases of its application had been registered at the end of 1883; and the mortality from carbuncle has been reduced ten times.

There is no need to follow M. Pasteur in his further researches in the *rouget* of pork, in boils, in puerperal fever, in all of which, with other maladies, he has applied the same methods with the same exactness that have characterized all his work. His laboratory at the École Normale is a collection of animals to be experimented upon—mice, rabbits, Guinea-pigs, pigeons, and other suitable subjects, with the dogs upon which he is now studying hydrophobia most prominent. There is nothing cruel in his work. His inoculations are painless, except as the sickness they induce is a pain, and the suffering they cause is as nothing compared with that which they are destined to save. On this subject he himself has remarked in one of his lectures: "I could never have courage to kill a bird in hunting; but, in making experiments I have no such scruples. Science has a right to invoke the sovereignty of the end."

What he has done, M. Pasteur regards as only the beginning of what is to be accomplished in the same line. "You will see," he has sometimes said, "how this will grow as it goes on. Oh, if I only had time!"

ART VIII.—A CONSIDERATION OF THE ANTHRAX INOCULATIONS OF PASTEUR.*

BY PROF. H. PUTZ.

In the year 1879 Pasteur communicated to the Adademy of Sciences in Paris that he had succeeded in cultivating the Virus of Hen Cholera in such a manner as to greatly reduce its virulence so that it could be safely inoculated on fowls, and that, when thus treated, they were rendered unsusceptible to natural infection.

Six months later, Toussaint, Professor at the Veterinary School in Toulouse, France, also sent a communication to the Academy that he was able to produce immunity against anthrax in animals by means of a cultivated and diluted preparation of the virus. The communication was, however, of a private nature. This raised discussion, and caused Toussaint to make public the peculiarities of his method. He authorized Bouley to open the document, and publish its contents. The essentials of his method were, that he inoculated animals with blood serum taken from known anthrax cases which had been subjected to especial treatment in order to mitigate its virulency. This end was attained in two different ways:

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* Translated from the Vorträge für Thierärzte. 7th Series, No. 1.

First. The blood from animals diseased with anthrax was defibrinated and subjected to the influence of a temperature of 55° C. for about ten minutes, and after being cooled, used as a fluid for inoculation.

Second. He treated such blood with carbolic acid—manner not given—and used it for inoculations.

Toussaint assumed that the first method of treatment caused the death of the anthrax-bacilli without injuring the infectious qualities of the material, but at the same time it was deprived of a portion of its virulence. He soon acknowledged that he was in error, however.

Lœffler has shown that subjecting anthrax blood to 55° C. for twenty minutes is not sufficient to deprive it of its virulent properties, *i. e.*, to kill the bacteria, but that it requires thirty minutes to bring out such a condition. Inoculations with such material are always followed by negative results, which is not the case with Toussaint's preparation, by which the virulence is not taken from the material, though somewhat lessened in degree.

Lœffler has further shown that the addition of carbolic acid to a medium containing anthrax bacteria, when it amounted to 1 to 1½ per cent., destroyed its virulency, but that ¼ per cent. did not. Blood containing anthrax bacilli is borne by many animals when mixed with a 1 per cent. carbolic acid solution in equal parts. According to Toussaint, it is this mixture that has been used in his experiments. A solution of ½ per cent. carbolic acid does not remove the virulence from anthrax material. Toussaint has made quite a number of experiments upon sheep with material prepared in the above given manner, and assumes that he has discovered that it protects these animals from natural infection by the elements of anthrax. In consequence of these communications Bouley induced the French Ministers of Agriculture to place quite a number of sheep at the disposal of the Alfort Veterinary School, in order to decide this question, which is of immense national importance.

On the 26th of August, 1880, Toussaint began the inoculation of twenty sheep which were placed under the control of the faculty at Alfort. Bouley reported upon the results of these experiments at a meeting of the Academy held in Paris on the 21st of September, 1880. Toussaint brought with him to Alfort, two vials containing fluid for the inoculation, that had been prepared in Toulouse some ten days previously. The sheep at Alfort were inoculated with a proportionally small amount of the same. Within the first four days subsequent to the inoculation four sheep died, and as their blood was found to be filled with anthrax bacilli there could be no doubts raised as to the *causa lethalis.* The remainder were sick, some severely, but all finally recovered. These were afterwards inoculated with pure anthrax material, and it was proven that the sixteen remaining sheep had acquired immunity against further infection. Toussaint had obtained similar results in eleven sheep treated in the same manner at Toulouse. Although these experimental inoculations were not found to be without some danger to the animals, still they conclusively proved that anthrax could be classed with those diseases which produced a certain degree of immunity in some of our domestic animals, viz: sheep, after one attack. The duration of this period of immunity could not be at present decided upon.

Toussaint warns against repeating the inoculation at too short an interval after the primary has taken place, and places the time at about twelve days subsequent, as he has learned by experience that cumulative action may be expected if the secondary or controling experiment is resorted to earlier. The *centrale* inoculation should only be made when all indications of the primary have disappeared. Chauveau has also recorded experiences confirmatory of the above. He also discovered that Algerian sheep possessed but little susceptivity to anthrax infection, for when he inoculated such with a moderate quantity of undiluted anthrax virus, they did not die, although symptoms of the disease could be distinguished in them. Secondary inoculations still more increased the immunity of these sheep towards anthrax contagion, if sufficient time was allowed to elapse (twelve days), but if not they caused death.

In No. 13 of the "Sammburg Klinischer Vorträge, Volkmann, 1882," is an interesting article from Eberth, which contains many valuable communications, as also some of a questionable nature. He remarks that anthrax can only be generated by specific bacilli, but not to the same degree in all animals, as these bacteria are remarkably sensitive to the nature of the nourishment offered by the constitution of the different animals, rats possessing a varying degree of immunity towards infections, while mice are very susceptible. Pasteur has not hesitated in pronouncing the results of his experiments on sheep as being somewhat questionable as to cattle, and has retained his affirmation of the preventive power of anthrax inoculation only for those animals by which he has obtained directly positive results.

Pasteur made his first communication to the Academy upon this subject on the 28th of February, 1881, in which he asserts that he has succeeded in preparing a lymph-fluid, by means of the artificial cultivation of the bacteria of anthrax, which can be used without danger to the animals for the prevention of anthrax. He can prepare this fluid in any degree of dilution that he desires by cultivating anthrax bacilli in bouillon made from chicken meat, in a temperature of 42 deg. to 43 deg. C., and allowing the free access of filtrated air. The infectiousness diminishes, with the prolonged action of oxygen, in such cultivations. His inoculation experiments with dilute cultivated virus made upon rabbits, guinea-pigs, and sheep, gave the most satisfactory results. The animals became only slightly, and in many cases were not perceptibly ill, and were immunable to any action of even natural virus after the results of the second inoculation had disappeared.

These experiments led the Agricultural Society at Melun to invite Pasteur to conduct a series of experiments under their auspices, which demonstrates the importance which these researches had assumed in the minds of the agricultural leaders of France. The Society placed sixty sheep and ten head of cattle at Pasteur's disposal. He promised, however, successful results with regard to the sheep only. The first inoculation occurred on the 5th of May, 1881; the second on the 16th, with the cultivated lymph; on the 31st the *centrale* inoculations were effected on twenty-five sheep, in concurrence with the same on twenty-five that had not been thus treated with genuine anthrax material. On the 2d of June twenty-four of the sheep that had not been through the preventive treatment were dead, and the twenty-fifth dying; while those that had been treated with the cultivated inoculations remained perfectly well, scarcely a rise in temperature being perceptible. Subsequent comparison of these twenty-five sheep with ten others that had been reserved for still further *centrale* experimentation, proved that the health of the former had been in no way interfered with.

The results of these experiments have infinitely more weight than all the opposition which soon followed to Pasteur's experiments. Pasteur also treated some 200 sheep at a farm near Vincennes belonging to the Alfort Veterinary School. I myself saw these sheep in August, 1881, and could observe nothing abnormal in them, save two holes in the ear where the preventive inoculations had been made. Two of these sheep were removed to Alfort after time enough had elapsed for them to acquire immunity, and with two that had not been so treated, were inoculated with a cultivated well known deadly material before the students. The two former sheep remained perfectly well, while both of the others died of anthrax on the second subsequent day.

These favorable results caused an immense degree of excitement in medical and agricultural circles all over Europe. It was doubted if such sheep could withstand natural infection, even though they possessed immunity against a cultivated virus of known deadly quality.

This question was taken up by a commission composed of veterinarians, doctors and agriculturists. On the 16th of July, 1881, they took 16 of the preparatory inoculated sheep from the farm at Vincennes, and 16 from Beauce, that had not been so prepared, and inoculated them with fresh material, in large quantity, taken from a sheep that had died from natural anthrax but four hours previously.

Three of the sixteen non-prepared sheep died of anthrax on the 17th of July; ten on the 18th, and three more on the 19th, while the prepared sheep from Vincennes all remained healthy, although each received, as did the others, 5 ccms. of the blood of the sheep that died of natural anthrax.

Although many skeptics were present at these experiments, the most doubtful of them became convinced of the value of Pasteur's procedure. The negative and in part doubtful results obtained by Oemler and Löffler are completely neutralized by such brilliant success as the above.

Incited by the above, the Hungarian Department of Agriculture invited Pasteur to demonstrate his inoculative treatment in their country. He was unable to accept the offer in person, but detailed an assistant, Thuillier, to visit Budapest—fall of 1881—and meet the wishes of the ministers. A commission of veterinarians, doctors, and others interested, was appointed. The results were published by Dr. Roxahiggi in the Deutschen Medical Wochenschrift, January 7, 1882, from which we take the following:

Anthrax bacilli develop most favorably in meat-bouillon in a temperature of from 25 to 40° C.; when the temperature is of a higher or lower degree the development decreases and ceases entirely by 15° C. or 45° C. Supported by the fact that birds, especially carnivorous ones, promise a certain degree of immunity against anthrax, Pasteur decided to cultivate blood containing anthrax bacilli in bouillon at a temperature of 42 or 43° C. He found that the bacilli grew to long threads, but did not develop permanent spores. (It should be remarked that the bacilli of anthrax have the staff and coccus form; the latter being their permanent form, in which they can remain for a long time resistant to many adverse influences). The longer he continued the cultivation under the constant influence of filtrated atmospheric air, the more did the fluid lessen in virulency, so that after the lapse of 24 hours so much of it had been taken away that sheep could be inoculated without subjecting them to any danger. Inoculations made with this material, *when* 12 *days old*, caused one-half of the animals to die of anthrax.

The bacteria remain active in such cultivations for from 4 to 6 weeks: after this time they gradually die. Wadding in the tube used to convey the atmosphere to the cultivation, answers every purpose of filtration.

The recent endeavor of Pasteur was to produce an inoculation lymph possessing more durable qualities.

Take a drop of the previously mentioned cultivated fluid at any time during the first six weeks after its preparation, and place it in a sterilized (freshly cooked) bouillon, which is to be placed in the cultivating machine at a temperature of 35 deg. C. The bacilli develop very rapidly. This new generation possesses the same degree of virulence that the original did.

After forty-eight hours' exposure to the above-mentioned temperature, the bacteria begin to develop permanent spores, the entire mass assuming this condition in the course of a few days. This *spore-fluid* has the same degree of virulence which the second cultivation had when introduced into the bouillon.

In this way we can produce a fluid of any wished-for value, and which will retain its active properties, if properly closed in tubes, for a long time.

Pasteur designates his twenty-four-days-old culture, as well as his second cultivation, primary vaccine, because he uses it for his first preventive inoculations. This is proportionally without danger to guinea pigs, rabbits, and sheep, as well as the larger domestic animals, while it is still able to kill mice. The twelve-days-old culture and its secondary product Pasteur designates as his second vaccine, while he uses it after the lapse of twelve days from the first inoculation. Twelve days after this second inoculation the animals should, as a rule, have acquired immunity against anthrax infection. At the Veterinary School in Budapest, Thuillier experimented upon six grown cattle and four calves and sixty sheep. The lymph, brought from Pasteur's laboratory, contained spores. Four sheep were directly inoculated with the same, while twenty-six sheep and five cattle were inoculated with freshly cultivated material prepared *en loci* by Thuillier for the occasion. Half of the animals were uninoculated. The first preventive inoculation occurred on the 23d of September, 1881, with primary vaccine; the second on the 5th of October. On the 8th of October one of these animals died of anthrax; the others were apparently but little disturbed. On the 17th of October the *centrale* experiments were made upon twenty-five prepared and the same number of non-vaccinated sheep, and five each of similarly treated cattle.

Of the non-vaccinated sheep, the first death occurred within thirty-six hours, and within eight days twenty-three of these animals had died, twenty-two of them surely of anthrax. Of the cattle none died, although one calf was quite sick, but recovered. The vaccinated sheep retained their immunity.

Resumé of the various experiments that have been made under Pasteur's control with his inoculative fluids:

1. The experiments conducted by Pasteur in person have

shown that preventive inoculations against anthrax have been made in different places in France upon cattle and sheep without danger.

2. The protective inoculations in France on sheep have proved that such sheep acquire immunity from anthrax. By cattle the results are still uncertain. It is, however, probable, that immunity can also be produced in cattle and other domestic animals.

3. The duration of this immunity has been proven to continue for about a year; it may yet prove to be during life.

4. The experiments made in other places by Pasteur's assistants have not been followed by the same uniformity in results as those done under his personal supervision in France, though by no means undermining the value of his researches.

5. Cattle are less susceptible to inoculative anthrax than sheep.

This subject may well be concluded by Frank's experiment upon the same subject, of which the following are the essentials: *

In the year 1882 the inoculation procedures of Pasteur with reference to anthrax caused a great deal of excitement in scientific circles, the Munich Veterinary School being no exception in this regard.

Anthrax appears most frequently in cattle among the various domestic animals of Bavaria; although sporadic cases continually occur, it is only at intervals that this disease assumes an enzoötic character. These outbreaks take place most frequently in that portion of Bavaria known as the Bavarian Alps. It is an interesting fact that the disease attacks cattle principally, and next in frequency the horse, while, although sheep are much more susceptible to infection, still only isolated cases occur among them. Nevertheless, in the well-known anthrax districts of Upper Bavaria both sheep and cattle are pastured upon the same mountains. This phenomena, which at first appears so singular, finds its logical explanation when we remember that these mountainous pastures are very extensive, and that the sheep seem to have an especial preference for the loftiest portions of the district, while the cattle prefer the more level and better grassed parts of the pastures. It thus

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* Jahrescherîcht d. K. Central Veterinair Schule, Munich, 1882, 1883.

results that while both sheep and cattle may graze upon the same mountain, still their grazing grounds are seldom the same. Where one has opportunity to study the outbreaks of anthrax in these districts he will soon become convinced that only certain localities are characterized by such eruptions, and conceive how it becomes possible for the sheep to remain free while the cattle become a prey to the disease.

These conditions gave us the reason for conducting our inoculation among cattle only. The question for us to decide was:

Does the inoculative treatment of cattle, according to the method of Pasteur, produce in cattle immunity against infection from anthrax? These experiments were made at the Government Station at Leuggries, in Upper Bavaria, a locality where anthrax frequently appears. For this purpose we procured six small cattle, one and a half years old. Other animals were also obtained during the course of the experiments.

The material for inoculation was procured from Boutroux, in Paris, consisting of Pasteur's primary and secondary vaccine. In the same—the examination was only made after the inoculations had been completed—one could see numerous groups of spores, but none of the specific bacilli of anthrax, and a few isolated drops of fatty material. The material was entirely free from any tendency to putrefactive changes, and no other germoid elements could be seen.

On the 5th of August, 1882, we inoculated six cattle with the primary vaccine, a little behind the left shoulder, following Pasteur's instruction to the letter. Each one received 1½ grammes of the material subcutaneously. The temperature of the animals was taken at 7 A. M. and 5 P. M. daily, but no change of note was perceived. Tumefaction did not occur at the point of inoculation.

After the elapse of fourteen days, the 19th of August, the second inoculation with the stronger secondary vaccine of Pasteur occurred, each animal receiving the same amount of this material as they had received in the first instance. We could perceive no reaction following this treatment.

The *centrale* inoculations with genuine material were made upon the 3d and 4th of September, *i. e.*, after the elapse of another fourteen days. To this end a sheep had already been inoculated on the 1st with well known active material; the animal died on the 3d under the characteristic symptoms. For the purpose of these *centrale* experiments, threads were soaked in the warm blood from the jugular of this sheep, and then drawn through the subcutaneous tissues of the left ear for a distance of about 1½ cms. This procedure was considered to promise better results than the subcutaneous introduction of a few drops of blood. On the 3d of September immediately following the death of the sheep, we inoculated No. 4 of the cattle that had been prepared as previously described, as well as a newly purchased non-inoculated one. On the morning of the 4th the remainder of the preventive inoculated cattle, 1, 2, 3, 5, 6, as well as a non-anticipatory-treated steer, No. 8, were also subjected to the *centrale* treatment. No. 4 (prevention inoculated) and No. 7 (not so treated) were also subjected to the action of a piece of material containing anthrax spores, prepared according to Buchner's method, viz: the spores are mixed with a mass made of gum arabic and sugar of milk, and allowed to dry. This was introduced under the skin of the left ear. All of the animals became sick in the same manner, whether they had been subjected to the preventive treatment or not.

In all of them tumefaction occurred at the *locus inoculationis*, being more marked in some than in others; 1, 4, 5, and 7 showed marked swelling, while it was weak in 2, 3, and 6, and moderately prominent in No. 8. Nos. 4 and 7 were notably sick on the 4th of September. On the 5th they were still much depressed, as well as Nos. 3 and 5. The temperature increased in all of them. On the 6th they all had some appetite, though it was weak in Nos. 4 and 7. No. 6 appeared entirely well again. On the night of the 6th of September the non-preventive inoculated animal No. 8 died; and on the 6th, No. 4, that had been subjected to this treatment. With regard to the symptoms, it should be again remarked that all of the animals sickened and two died when inoculated with recognized virulent material. It is not always those animals by which we observe the highest temperature, that die or are always the sickest.

Were one to see such animals upon the pasture and not know that they were infected with anthrax, he would consider them to be perfectly well, unless a special examination were made. The same thing occurs in eruptions of anthrax among the cattle on the mountains. It is probable that in such cases many more cattle have the disease than are suspected by the observer, as all animals complicated by anthrax do not necessarily die, and as we have shown the majority recover even when inoculated with pure anthrax blood. It is therefore highly probable that in the natural outbreaks of anthrax among cattle, many cattle recover without any one having an intimation that the disease has been at work in their systems. This is especially true of young cattle and oxen, while in cows the rapid decrease in the milk production would naturally call attention to the prevalence of disease and the necessity of an exact examination. The circumstance that cattle can thus be attacked by natural anthrax and still recover, is of the greatest practical importance, and seems to have, in general, escaped the observation of veterinarians. The continued study of the inoculation question will show that cattle acquire a more or less extended immunity from anthrax after once having been through with that disease. Accordingly, cattle that have had it in this "still," unperceived manner, upon their grazing grounds, may also possess this acquired immunity. It is probable that many apparently healthy animals would thus appear as if they had been subjected to preventive inoculation after a herd had been through an enzoötic outbreak. This may also be the reason why such eruptions among our Alpine cattle are generally of such short duration, and that in the next, or for several years, eruptions of a like severity do not occur.

This is a point which should require the most exact study in coming years.

Another interesting point is, that while all the inoculated animals had more or less tumufaction at the point of insertion, those that were subjected to feeding experiments with pure anthrax material, did not present such swellings. It is well known that in natural infection many animals have such swellings—of them it has been assumed that many recover—which is not the case in others. The last form is considered the most fatal. It is therefore highly probable that genuine anthrax fever develops when the spores gain access to the organism by means of the digestive tract, while tumefactions result from the outward inoculation by means of worms, flies, etc.

These are, of course, the two ways in which the germs, in general, gain access to the organism. The above-described experimental observations show to a certainty that Pasteur's method of preventive inoculation is not capable of preventing a secondary attack in cattle. As the material gave no indications of having been spoiled, we must conclude that it was too weak to produce this result.

When we pass in review the various experiments which have been made with this material in France and elsewhere, both upon cattle and sheep, we must conclude that much is still wanting to the completion of this method.

In saying this we have no intention whatever of detracting an iota from the true value of Pasteur's discovery. On the contrary, I hold it still to be one of the greatest discoveries of the Nineteenth Century, as the focus of the most important step in experimental prevention of many diseases which will sooner or later be of the utmost practical importance.

The objections to be overcome are: The material of Pasteur is at present very variable in its action—now too weak and again too strong. Hence, for the practical execution of preventive inoculation it would be necessary to first prove the material, which, on account of its fluid form, is at present impossible, as the material once opened to the air is liable to pollution and the consequential change in its nature. A material must be prepared in the future which will admit of such tests without causing injury to it.

It has been shown that Pasteur's material occasionally suffers changes that have been followed by septicæmia, etc., when used for preventive inoculation.

Again, different grades of this material must be prepared and adapted to the constitutional peculiarities of our different animals. In order to arrive at this necessary point the material must be prepared in such a form that it can be used for experiment without the danger of its becoming polluted or injured by contact with air.

Still further feeding and inoculative experiments were made upon those cattle that had withstood the inoculation with genuine anthrax material, and in no case was it possible to produce anthrax in them, even when some six months had elapsed, and the feeding experiments continued for a long time with well known malignant material.

These experiments will be continued in the hope that such graded material may be found, and a manner of preparing it suitable for use at all times with conformable uniformity in results.

The above experiments conclusively show that cattle acquire immunity from second attacks of anthrax if they have once had that disease, and that this immunity exists for some time. Pasteur and others have conclusively shown the value of his preventive treatment for sheep with reference to this same disease.

EDITORIAL DEPARTMENT.

VETERINARY QUESTIONS IN THE UNITED STATES.

With this number of the JOURNAL we begin a New Year, and earnestly hope that it may find each one of our readers more successful than any previous one has been. We shall spare no labor in our endeavors to still more markedly make our publication a Journal of Comparative Medicine, in fact, and must again reiterate our frequently repeated requests for assistance from the members of the profession. Without in any way desiring to pass any reflections upon other journals devoted to the interests of the Veterinary Profession in the United States, we feel that we can truly say that the JOURNAL OF COMPARATIVE MEDICINE is the only veterinary journal published in America which is exclusively devoted to the advancement of the profession, and which is absolutely free from any school or local entanglements. Wherever we find a school which deserves favorable comment, we are not afraid to give it any more than we are to condemn injurious actions on the part of any of them. In this regard we desire to speak a word about the schools. As the case now stands we know of but three schools on the American continent that are worthy of public patronage, and it should be the united endeavor of every honest veterinarian to support them to the best of his ability. These schools are the American Veterinary College of New York, the Veterinary Department of the University of Pennsylvania, and the college or school at Montreal. We are well aware that there are other schools in the country, but they have so much in question about them that we do not feel warranted in recommending them to students. We have before us a Chicago paper from which we have cut the following advertisements:

CHICAGO VETERINARY COLLEGE, Nos. 79 to 83 East 12th Street, Chicago, Ill. Established 1883. Chartered by the State of Illinois.
A. H. BAKER, V.S., *Principal*,
145 Michigan Avenue, Chicago, Ill.

MANGE IN DOGS. Use "Baker's Mange Cure." It kills the parasite every time. It is used by all the best breeders and fanciers in America. Price $1 per pint bottle. Regular discount to the trade. Agents wanted in every town. Address,
A. H. BAKER, V.S.,
145 Michigan Avenue, Chicago, Ill.

The reader will observe that the principal of this so-called college is also the advertiser and proprietor of what every honest medical man looks upon as a Quack Medicine. The time has surely come in the United States when students must assume some responsibility as to the character of the schools from which they graduate. We go even so far as to look with disfavor upon the methods of all schools that advertise in sporting papers. With reference to the Philadelphia school, we have every reason to congratulate ourselves upon its foundation. Its principles are correct; it is gradually being well founded, but it will never be a veterinary school *par excellence* until every teacher is a veterinarian, and until it is rich enough to so pay them as to be able to forbid any teacher entering into competition with private practitioners by attending on patients outside of the school-hospital. The same objection is to be raised against the school of Montreal. It has been fully settled, in Europe, that M.D.s have not, in general, the ability to practically adapt the principles of medicine to the needs of veterinarians.

We cannot leave this subject without saying a word for a school which has been for so many years a great blessing to this country, and which has been the work of so many years of active devotion to the cause of our profession in the United States. Of course, we mean the American Veterinary College of New York. While this school has but a two years' course, it has still been a matter of surprise to us with what success its teachers have been enabled to educate a great number of unusually practical men. We have observed them carefully and sceptically, and must say that what we have seen of the alumni of this school have been exceptionally good routine practitioners, and what is more, that they have all had a certain respect for the true value of an advanced scientific education which, as the case has thus far been in our country, is an unnecessary qualification in the veterinarian.

We say "unnecessary qualifications!" Why? Because we have not a Veterinary Police Organization in any part of the country, though it is to be sincerely hoped that the nucleus has been laid in the present Bureau of Animal Industry.

The march of events is, however, assuming a very rapid, and at times, almost climaxical, advancement, which indicates that before long there will be an increased demand for men of exceptional ability by the various States. When this demand becomes active there will be a call for a school of a different and more advanced character, and we firmly believe that the labor and devotion of so many years will not have been spent in vain, and that the government of the United States will yet see the necessity of establishing a national institution for the development of comparative experimental and preventive medicine, which shall be second to none in the world. We believe in the possibility of such an institution. We know that the cost would be nothing to a country with over one hundred millions surplus revenue.

It is only necessary that these contagious animal diseases continue to make themselves more and more felt by the individual American; that each citizen become more and more educated in the intimate relation existing between many animal diseases and the public health; that the great intelligence of America is gradually brought to realize that the grand work of the study of causes of disease, especially those of an infectious nature, is dependent upon the development of comparative pathology, to have Congress realize that one of its duties is to establish such an institution.

The entire stock-raising, dairy, agricultural and hygienic interests, as well as the medical and veterinary professions, are blind to their duties, to themselves and the country unless they realize this point, and take active measures to bring it to the needs of their representatives in Congress.

The advocating of this idea, the endeavor to impress it upon the minds of the people, is as much a duty of the Commissioner of Agriculture and each State Board of Agriculture as is the endeavor to suppress existing diseases.

What we want more than anything else in the United States, except an honest government, is an institution for original research into the causes and nature of disease. It is a disgrace to so wealthy a country, a reflection on our practical common sense, that earnest men who love their country and humanity above all else, must go to Europe in order to fit themselves for such work. It is still more a disgrace to the country that there is no place for them to continue their labor on their return; but that instead of being valuable aids in the civilization and prosperity of the country, such men must be lost in the daily work of a routine practice.

We cheerfully admit being somewhat cranky upon this subject, but are willing to be found in the company of the Virchows, Pasteurs and Kochs of this world, whatever becomes of us in the next.

In our editorial capacity we have frequently requested our colleagues to send us reports of the occurrence of contagio-infectious diseases, and their observation as to their nature and causes of their extention; with what success our readers can best judge. The editor of the *American Veterinary Review* has also made a like request, with an equally favorable result. This will not do. A profession that is too indolent to help itself is unfit to exist.

The editor of the *Drover's Journal* seems to think that the whole purpose of the Bureau of Animal Industry is to make a raid upon the next Congress for funds. This person has of late been doing his utmost to bring our profession into disgrace by the publication of the most absurd libels about certain public officers. He asserts that there is not a single case of pleuro-pneumonia-contagiosa in the country, and even infers that there never has been. Happily we do not need to go far for our justification, as in the *National Live Stock Journal* —Chicago, September and October, 1884—we find its existence most strongly proved, even by autopsies. This journal does not appear to be any more favorable to the government veterinarians than the former.

The cases quoted by the *Drover's Journal* against former government officials have nothing to do with the present Bureau, unless it still retains those officials, of which at present we are uninformed. We have repeatedly referred to them, and equally consider them inexcusable; but we do not believe that there is no lung plague in the country any more than we do that the chief veterinarian of the United States would make a false statement, which both of these journals are doing their best to impress upon the minds of their readers. If it is the purpose of the Bureau to make a raid upon the public funds, its desires are very moderate in comparison to those which we have advocated for so many years, and which we shall continue to emphasize so long as we have power to wield a pen—

though we have no desire or expectation of being present at the annual divide, being what has been termed "uncontrolable, erratic, with some good points." One thing is sure, we would not falsify or keep silent over the discovery of a scientific fact if we saw the destruction of the whole animal industry before us. We discovered trichinæ in our pork to a very large degree. We know it is more so than any known pork. The effect of such a discovery is nothing to us. The fact exists. It is the duty of the government to find out the cause and prevent its action—not to suppress the fact. That this is the principle that rules our Chief Veterinarian may be seen from his own words:

"I can assure you that this department does not hesitate to diagnose a case of pleuro-pneumonia when it has sufficient evidence to base a diagnosis upon."

We shall never cease our work until we see a State Veterinarian in every State, and County Veterinarians wherever necessary, and every city with its municipal abattoirs and corps of competent inspectors.

No such officials should be appointed as they now are, but all should be previously subjected to an examination.

The present methods of slaughter-house inspection is a humbug. We have a right to know how many cases of disease occurs; the species and sex most frequently attacked, and the nature of the disease in every animal and organ. "So many pounds of meat condemned" means next to nothing.

Public hygiene in America is almost a farce in this regard as at present conducted.

We will again repeat what we have heretofore stated, that we still have the utmost confidence in the ability of the Chief Veterinarian of the Bureau of Animal Industry, though we do not believe in the possibility of his being able to extinguish pleuro-pneumonia from the West in six months, if there are six hundred cows there, as he is reported to have said he will do. Our Government Veterinarians have the same difficulties to overcome that are still troubling our English cousins. They have to contend with local and general rights. The people of this country have yet to learn that in the combatting of contagious animal diseases there is no such thing as local or State rights. This is a question over which our legislators will have to wrestle for many a day before they will come to any satisfactory or beneficial conclusion.

Pleuro-pneumonia can be stamped out of the United States in one year, but it will take the united endeavors of the owners of diseased animals, the public officials, the Government itself and the veterinary profession to do it. Once out, it can be kept out, but only by the employment of men of the most exact education and autocratic character by the Government in the place of the half-educated men many of its officials at present are, and too many have been. The only way to have good work done is to appoint men of this stamp, and have the laws so made that they shall retain their positions—unless neglectful of duty—no matter how much political opposition may cry out against the severity of their actions.

A writer in the *Live Stock Journal* for September, 1884, says: "Where the disease came from and how it was introduced into this State—Illinois—is a matter of no great importance." According to the same journal, the disease was introduced into Illinois by cows purchased in Ohio.

On the contrary, this is the most important question of all. We have quietly comforted ourselves that the disease is still in our sea-born States, yet with one jump we find it in Ohio, Illinois and Kentucky, and cannot say but what it will yet extend to the western plains.

With all charity, we must say that some one is to blame for this sudden extension of the disease beyond the Alleghanies, and that party is either the Government of the United States or that of the States.

The fault of the introduction and extension of contagious animal disease lies primarily with the Washington government, secondarily with the State governments.

We boldly assert that they cannot be controlled until the people demand the governments to give them a National Veterinary Police System of the character previously mentioned. State systems will not do. The laws must be National. The force National. State rights are a humbug when these questions come to be considered.

A National Veterinary Police Force is a national necessity.

The present schools cannot give us the men we want for such a force as they are now organized, hence we also require a national institute for the development of comparative and preventive medicine.

Pile up the statistics, veterinarians, of the occurrence of contagious diseases; Tuberculosis also in your districts; observe how they extend; report them to your journals; look upon the Bureau of Animal Industry as your friend, and allow no petty jealousies to lead you to lessen its influence. We cannot all be heads, but it takes just as good a man at the stern as it does on the lookout to keep the ship of State moving. B.

REMUNERATION FOR THE LOSS OF ANIMALS SLAUGHTERED ON ACCOUNT OF CONTAGIOUS DISEASES.

This is one of the most difficult problems to solve of the many which come up in connection with the stamping out of diseases of the above nature.

Beginning with existing conditions, such diseases may be logically divided into two great classes:

1st.—Domesticated diseases, or such as have prevailed among our animals to a variable extent for an indefinite period, no one being responsible for their introduction. Texas Fever and Glanders illustrate this class.

2.—Imported diseases which find or have found their admittance into and extension over the country through the ignorance of our legislative authorities, or through the carelessness or unfitness of veterinary or other officials.

Of this class are pleuro-pneumonia, foot and mouth disease, the genuine—not the Kansas—rinderpest, or any other diseases which prevail in other countries, but are not at present, or have only recently become, domesticated in the United States.

Let us take the contagious lung plague and the foot and mouth disease for especial consideration, as they have both attracted much public interest during the past year.

They have both gained access to our shores by the carelessness or incompetency of the Washington Government through its representative officials.

With reference to the eruption of the foot and mouth disease in Maine during the spring and winter of 1884, which was so ably stamped out by the State authorities, under the guidance of our colleague, Dr. Bailey, there is not a particle of doubt that it was due to the carelessness and incompetency of the empirical Government Inspector. We would impress it on the mind of the editor of the *Drover's Journal* that this person was not, and is not, what the educated world recognizes as a veterinarian. The question then arises, who should pay the losses caused to the owners of domestic cattle from a disease thus acquired from imported cattle, which, contrary to the very rules of the government, were allowed to be driven over the public ways by the officials of the government—its veterinary inspector and Collector of Customs. Unquestionably, we say, the United States Government should be held responsible for such damages.

In the previously mentioned disease the question of damage is largely one of loss of use, but in other diseases we have to do with the question of absolute slaughter.

We will now turn our attention to the lung plague. Here we have to do with absolute slaughter. Here, also, we come face to face with another serious complication. Admitting that its first introduction is due to negligence on the part of the Washington Government in the case in point, how did the disease get across the Alleghanies into Ohio, and who is responsible for its non-recognition in Ohio, and hence its extension to Illinois, and from thence to Kentucky? We are simply suggesting questions which must surely arise when the question of settling the damage comes up for final consideration.

To our mind the Washington Government is only responsible for damage caused by imported cattle from the time of landing in the country to the time of their being delivered at the point of final destination. This includes the quarantine. From this time they become the property of State individuals and the State authorities are responsible for their sanitary condition.

In the case of the recent outbreak in the West the question of the manner of the extension of the disease becomes a most serious and complicated problem for the various authorities to solve. As the animals are said to be more or less Jerseys, the Government is relieved of much responsibility from the fact that the lung plague is unknown among the cattle on the channel islands. Hence they must have acquired it in this country.

The next question is, Where?

The question of the individual responsibility of owners, dealers, carriers, etc., is one that will also have to be settled in a uniform manner for the whole country, or the most unpleasant complications will finally arise. Diseased cattle will be smuggled and transported into States where the laws are less vigorously executed from those where the authorities are more wide awake. Another point of immense importance is, what is value of the condemned animal?

Where the owner is blameless and the authorities the responsible party, the full value of the animal slaughtered on account of contagious disease, should be remunerated to the owner.

In this regard I find myself in opposition to ruling opinions on the Continent; nevertheless, I believe right and justice are on my side.

The question is, what is the full value? In Europe, they say, the average market price, according to the nature, whether as a draft or flesh-producing animal. What are known as fancy animals have no extra value.

We do not agree with this opinion. Fancy cattle, or animals, are imported at a risk, held at a risk, cannot be insured as such, yet are of immense benefit to the country.

We would not be controlled by the speculative fevers which frequently occur with reference to such animals. The question is settled very easily as follows:

If a Bull, what are his services as such worth per year? that is, what did he net the last year or six months in this regard? If a fancy cow, say a Jersey, what was the value of her butter or milk during the last year; and what, if pregnant, would her calf be worth when weaned?

Again comes in the question of age, and the probable life of the animal, with the value of its annual earnings?

The annual earnings should be looked upon as the interest of a certain amount of capital which would give the approximate value at the time of slaughter, with the exception of the approximate earnings, for an average duration of life.

Ordinary cattle and horses, or other animals, have their well-known market value for every day in the week. We have simply made these suggestions in order to call the attention of those interested to the very complicated nature of all these questions. To treat the subject fully would require a textbook and months of study. B.

THE FACTS AS TO THE STAMPING OUT OF CONTAGIOUS ANIMAL DISEASE.

The following is taken from a late number of the *Jersey Bulletin :*

> Prof. Salmon, the head of the Bureau of Animal Industry, who is preparing his first report, says that the bureau will not be a success until Congress gets rid of the ridiculous and exploded State rights theory, as far as it pertains to this subject. We are much hampered by the law, and there is no satisfaction in spending months of labor to find the disease attacking the stock-producing industry, and not to be able to get rid of it after we find it and definitely locate it. Pleuro-pneumonia is rapidly spreading in the West. We are unable to do more than coöperate with the State authorities. Without the aid of Congressional action, there is no hope.

The editor expresses surprise that Dr. Salmon should express the views he does, and that he will thereby "do more harm than all the pleuro-pneumonia."

The truth of the matter is, that Dr. Salmon is the first man in the position which he occupies, that has been man enough to tell the truth about the impossibility of stamping out contagious diseases in our animals if they obtain any great degree of dispersion in different herds in various States.

Over three years ago we stated that it would be impossible to do it in the United States, and we have been constantly stating it ever since, so long as the doctrine or principle of State rights had any recognition whatsoever.

We dogmatically assert that in spite of the utmost and most honest efforts of the United States government, no matter what money they spend, no matter if they kill every diseased animal in the country, and every one that is at present suspected to be diseased with the lung plague, that the Washington authorities can never stamp it out until the doctrine of State rights is absolutely abolished with regard to these questions, and we have one National Veterinary Police system for the country.

Britain has tried the same game. She would not listen to the advice of her best Veterinarians, but, like our government in the past, paid far more attention to what quacks and empirics had to say. The "rights of the British freeman could not be interfered with," when the fact is, the individual or individual state has no rights when, by their action or non-action, the whole home population of a country is endangered. Even to-day the British Government cannot get rid of the lung plague because of the non-support and "rights" of the local authorities. B.

RELATION OF ANIMAL DISEASES TO THE PUBLIC HEALTH.—Apropos of the subject of the preceding article we find in Dr. Billings' book with the above title some statements which will illustrate the point.

Referring to the fact that in the thirty years during which the English ports were thrown open to the introduction of foreign cattle, the loss has been 5,500,000 head of cattle valued at £83,000,000, caused by pleuro-pneumonia and "foot and mouth disease," and in view of the possibility of an epidemic in this country, the Doctor says, "there is but one rule for its treatment: *No temporizing.* Immediate slaughter and redemption by the government."

"It is highly probable that were the real facts known, the ravages of contagious diseases have cost the people more in the last hundred years of our existence than our national debt amounts to."

"Every one should know that, if not absolutely preventable, yet it is possible for a competent Veterinary Police to reduce these losses to a very low minimum." "No prevention can be hoped for until we have a national code of police laws and an efficient body of educated veterinarians to execute them."

What can we expect from the present condition of legislation in this matter, when we hear a prominent Boston merchant exclaim on learning that there was no law to prevent his sending trichinous pork to market, "Thank God! there is some freedom left in Massachusetts."

Veterinarians will find in Dr. Billings' book much important information and many practical hints, which will be highly valuable to them in studying the actual condition of the cattle industry, the dangers to which it is subjected, and the protection which it needs. C.

ABSENCE OF DR. BILLINGS.—Through an oversight we failed to announce in our last issue the departure for Europe, in September, of our associate, Dr. Billings.

The doctor is now in Berlin pursuing the object of his journey, which is to make a thorough study of all that pertains to the germ theory of disease, especially the best methods of cultivating bacteria. In this he receives the direct aid of Professors Virchow and Koch.

In taking this step Dr. Billings seems to have foreseen the importance of the knowledge which he has gone to seek. In a paper on the probable epidemic of Asiatic cholera in this city, Dr. E. C. Wendt calls attention to the necessity of efficient action by the health authorities, and says: "In view of recent discoveries it now seems possible to decide positively, and in a very short time, whether we are dealing with the benign or the malignant disease."

He advises the government to send a number of medical men to Berlin to learn the latest methods of bacteria investigation, with a view of introducing bacterioscopy as a special study in the medical schools of this country.

Moreover, we all know how much skepticism exists even among scientific men on this subject. The other day one of these latter, to show the absurdity of Koch's doctrine, swallowed a couple of million of *comma-bacilli* without inducing the slightest choleraic symptoms. Did this prove the benignancy of the microbe? Not at all. It simply showed that one of the necessary factors in the production of the disease was wanting, viz: a proper soil. The man was in good hygienic condition, or he may have taken *comma-bacteria* instead of *comma-bacilli*, the former, according to Koch, being found in simple cholera morbus, while the latter are peculiar to the Asiatic type. Here we see the value of microscopical investigations. We also arrive at the conclusion that since on the nature of the soil, as well as on the malignancy of the microbe depends the production of the disease, strict sanitary measures should be enforced in order to make that soil germ-proof, and quarantine regulations established which will prove barriers to the entrance of the terrible *bacillus.*

Desiring for the doctor complete success in his undertaking, we look forward with pleasure to his return and with interest to the publication in this JOURNAL of the results of his labors.

C.

BUREAU OF ANIMAL INDUSTRY.—The new bureau in the Agricultural Department is doing good work. Its field of operation is a wide and important one—the sanitary condition of 42,500,000 cattle valued at $1,105,715,703.

The enormous extent of this industry, and the terrible results that might follow the introduction and spread of a contagious disease among such an immense herd, were forcible reminders of the necessity of strict vigilance on the part of those who were placed in charge.

Commissioner Loring co-operated with Prof. Salmon in this work when an epidemic threatened, and the cattle dealers throughout the country gave their aid, giving information which was of great value to the industry.

Experiments were made at Washington to test the contagiousness of pleuro-pneumonia, the results proving that only cattle in poor condition are attacked when exposed to the infection.

Later, the bureau ordered the inspection of the stables, stock yards, and slaughter-houses in this city. In 756 stables, 26 out of 3,318 cattle were affected with pleuro-pneumonia. On Long Island 325 diseased cattle were found out of 10,072 in 1413 stables. In Staten Island 12 out of 3,857 in 555 stables. In Jersey City 8 out of 180 in 13 stables. The New York offal dock developed 20 cases out of 63 inspected; the slaughter-houses 14 out of 76 inspected, whilst Brooklyn showed 100 in 868 cattle in 60 stables.

In extirpating these diseases isolation proved a marked success. The report of the bureau to Congress will be of special interest.

C.

THE SUPERIOR ROYAL SCHOOL OF VETERINARY MEDICINE OF MILAN.—The report for the above institution for the year 1884 is quite an extended one of nearly 200 pages, and has some fine illustrations. It opens with a historical description of the school by Prof. Langellotti-Buonsanti, its Director. He tells how veterinary medicine was first taught as a science in France in the latter half of the Eighteenth Century by Claudio Bourgelat, who founded two schools in less than a decade, one in Lyons and one in Paris. The news soon spread throughout Europe of the immense benefits which agriculture derived from the establishment of these schools. Lombardy could not remain indifferent to the question, and the government sent two *talented persons* to Lyons to study the science of Veterinary Medicine, as in no other country was it more necessary than in this. The proposition ran thus: "Cultivators are men most precious to the State, and the cattle in which they are so rich, are indispensable for the sustaining of that most noble, useful and ancient art, Agriculture, and we cannot without pain and fear see those animals sick or wounded, exposed to die without assistance, or perhaps abandoned to the blind superstitious practices of persons without principles or education."

Having completed their studies these gentlemen returned to Milan, and the school was opened in 1791.

The course of instruction occupies four years and is distributed as follows:

First Year.—Botany, Zoölogy, Chemistry (organic and inorganic), Descriptive Anatomy, Experimental Physiology.

Second Year.—Descriptive Anatomy, Experimental Physiology, Exterior Configuration of the Animals, Race, Hygiene (first part).

Third Year.—General Pathology and Pathological Anatomy, Materia Medica, Hygiene (part second), Podology, Topographical Anatomy, Medical Pathology, Surgical Pathology, Operative Medicine, Clinical Medicine, Clinical Surgery.

Fourth Year.—Medical Pathology, Surgical Pathology, Clinical Medicine, Clinical Surgery, Operatory Medicine, Obstetrics, Commercial Veterinary Jurisprudence, Zoötechnics, Clinic for Cows and Swine.

The clinics are divided into three services: Stable clinic, Polyclinic, and Ambulatory clinic.

The first is intended to supply the students with practical materials for study, and to serve as a model hospital for the cure of sick animals where the results of treatment can be seen, and the use and mode of application of new instruments can be learned, especially for the purpose of stimulating research in the most important branch of veterinary science: viz., contagious diseases.

The second proposes to give the students a practical knowledge of the daily routine of cases, making diagnosis, prescribing, etc.

The ambulatory service is found only in this school. It is intended for the fourth year students, and consists of a series of excursions into the country in company with a professor. Sick animals are treated, operations performed, and lectures given in relation to all matters of interest to the student, reproduction, confinements, etc. Microscopical examinations are also made.

The Library contains 4500 volumes. The Laboratory is arranged so that each student can avail himself of all the facilities it affords for complete investigations in any branch of veterinary science.

The Anatomical Museum is complete. Among the objects of interest it contains the skeleton of an Arab horse used by Napoleon in the Egyptian campaign.

The Report closes with a long list of scientific publications by the professors. C.

VETERINARY DEPARTMENT, UNIVERSITY OF PENNSYLVANIA.—This institution was formally opened on Oct 2d, 1884, the introductory lecture being delivered by Prof. Huidekoper, Dean of the Faculty. The course of instruction extends over three years, and includes the following subjects:

First Year.—Chemistry, Materia Medica and Pharmacy, Physiology, Histology, Botany, Zoölogy, Veterinary Anatomy and Forging.

Second Year.—Medical Chemistry, Physiology, Therapeutics, General Pathology and Morbid Anatomy, Veterinary Anatomy, Surgical Pathology, Internal Pathology and the Contagious Diseases, Botany, Zoölogy and Practical Farriery.

Third Year.—Therapeutics, General Pathology and Morbid Anatomy, Surgical Pathology and Operative Surgery, Internal Pathology and Cutaneous Diseases, Sanitary Police, Obstetrics and Zoötechnics.

In the second year the student will attend clinics, and will serve as an aid in the hospital. In the third year he will be placed in charge of sick animals and be required to make clinical reports and autopsies. He will also make regular visits to breeding and dairy farms and to slaughter-houses, in order to familiarize himself with the races of animals, the economical means employed in their care and the varieties of butcher-meat. C.

KOCH AND HIS METHODS.—We beg to announce to our readers that the April number of the JOURNAL will contain a portrait of Prof. Koch, as well as an article with the above title from the pen of his friend and co-laborer, Dr. Albert Johne, of Dresden.

CASE DEPARTMENT.

I.—AUTOPSIES AT CENTRAL PARK MENAGERIE.

Beaver (*Castor fiber*).—Young male received from Central Park Zoölogical Gardens, Oct. 6, 1884, at 12.30 P. M.; autopsy at 3.15 P. M. same day.

Body well nourished, neglected (?), and covered by fly maggots in several places; evidently not longer dead than twenty-four hours. It was noticed, on opening the abdominal cavity, that granular matter (grains of wheat, sand, husks of barley and oats) were lying in the abdominal cavity. Further examination revealed the existence of *a large perforation* of the splenic end of the larger curve of the stomach. The perforation was shaped irregularly, covering the area of a three-cent (silver) piece; a bridge of stomach substance, bifid at its verteo mesal end, ran across it, so that in reality there were two larger subdivisions, and one smaller opening.

The edges of the opening were of a greenish gray color. This discoloration extended around the opening for nearly a centimetre.

The external (peritoneal) coat of the intestines was injected, food in large quantities was found among the intestinal folds. It showed exactly the same characters as the food contents of the stomach, and had evidently escaped from the aforesaid openings; from the latter a bolus of husks, grains, sand, and mucus was found protruding.

The liver was fatty—a normal occurrence at this season in animals destined to hibernate. The heart was perfectly healthy, likewise the kidneys.

The nerve-centres, brain, and spinal cord were pulpy, and did not show the consistency they should *caeteris paribus* have shown in so fresh a body. The pia mater was injected both in its spinal and its cerebral portions. This softness and injection of the nerve-centres and their membranes has been frequently found in animal and human subjects who have died of surgical shock, associated with septic states, or in the early stages of peritonitis.

In the subcutaneous cellular tissue of the thorax, abdomen, and neck, hemorrhages and grayish infiltrated spots were observed, such as are characteristic of a scorbutic state. There was an ulcer in one of the cœcal appendages.

Anatomico-Pathological Diagnosis.—Scorbutus; necrotic or gangrenous ulceration of the stomach; perforation of the gastric wall; escape of gastric contents into the abdominal cavity, and death by shock from the inflammatory involvement of the peritoneum.

Dog-faced Baboon (*Cynocephalus porcarius*).—Middle-aged, fair condition, tubercular infiltration of the peribronchial glands; several spots of "reactive" inflammation in the lungs; intestines contracted and atrophied. There was an exudation of blood, mingled with serum, under the pia mater and in the upper layers of the cortical brain substance, extending into the sulci. This was strictly limited to an area of the size of half a dollar, covering the first, second, third, and fourth gyri of the temporo-sphenoidal lobe of the left side, near the apex of the latter. The consistency of the tissues of the brain and spinal cord generally was softer than usual, but there was no disease of the blood vessels to account for the hemorrhage. It suggested the possible causation by a blow or fall. ***

II.—REMOVAL OF A PORTION OF THE TEAT OF A COW.*

A cow laboring under difficulty of milking was obliged to wear a rubber tube without a button at the end, which passed through the entire duct of the teat. Another tube was introduced which pushed the first to the extremity. I was called for the purpose of extracting the tube, which was done after much labor with a fine tongs, by means of which I drew out the first portion by a twisting movement. To extract the upper portion I was obliged to remove a considerable part of the teat. Strange to say, contrary to what I expected after the healing of the wound, the secretion of the milk proceeded as well as ever, and discharged itself through the stump whilst the other teats were being milked. I saw the animal again after the following delivery, and found everything concerned in the milk secretion doing well.

III.—CASES OF TETANUS SUCCESSFULLY TREATED.†

M. Stazzi, V.S., of Brescia, reports that of ten cases of tetanus which he has treated among horses, mules, and asses, seven were successful. His treatment is as follows: the application of an enormous blister to the spinal column, extending from the neck to the tail; hypodermic injections daily of morphine, varying from 30 to 80 centigrammes according to the force of the malady; and enemas containing 15 grammes of extract of belladonna.

The hypodermic injections of morphine until complete cessation of tetanic convulsions is attained, which is generally about the second or third day of the disease. From this time onward 5 grammes of extract of belladonna should be administered. The stable should be kept dark and quiet.

Paralysis of the intestines sometimes occurs during the administration of the medicines, and in this event they should be suspended for a few days, to be administered again when the paralysis ceases.

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* Wochenschrift für Thierheilkunde und Viehsucht.

† La Clinica Veterinaria.

M. Trevisi, V.S., of Asolo, has had equal success under a different plan of treatment. Besides the injections of morphine, he uses inhalations of ether and chloroform, and frictions of the ointment of cyanide of potassium on the jaws and along the spine. He also recommends absolute tranquillity and darkness of the stable.

M. Cracos, V.S., of Lucera, uses hypodermic injections of morphine over each jaw, with inhalations of ether and chloroform, enemas, and a dark quiet stable, and generally brings about a cure on the fourth day.

IV.—ANGINA PARALITICA IN THE HORSE CAUSED BY THE USE OF ENSILAGE.*

BY DR. MARIO ORTOLANI.

Through the experiments made by Baron Turriri on his farm, the practice has spread through Sicily of storing in silos the fodder which grows spontaneously in the natural Sicilian meadows.

It now appears that two proprietors who followed the example of the Baron, giving this ensilage to their horses, have seen them first become sick, and afterwards die with symptoms described in the reports which are attached.

Meanwhile it is to be remarked that the feeding of cattle here in Palermo with two-thirds of ensilage, composed principally of *Avena Sterilis*, *L*, the other third being composed of different vegetable matter, has given excellent results, and I have not as yet to lament any deterioration in the health of the cattle.

Called to study the cause of death in the horses, the first idea which came to my head was that some fungus in the fodder was the cause of the pathological changes in the mucous membrane of the nose, mouth, and pharynx, but was unable to make microscopical investigation. For the present I will limit myself to a reference to the reports of the proprietors who suffered loss.

The first states that until the twelfth day of the administration of the fodder, the animals thrived. Then it was noticed that, although with desire for food and ability to masticate, they were unable to swallow solids or liquids. The tongue became paralyzed, and hung from the mouth. On the following morning the sight was lost, and in twenty-four hours from the first manifestation of disease death took place. Autopsy disclosed ulceration of the pharynx as the only abnormal condition. None of the animals had fever, and there were no diphtheritic patches.

I examined some of the fodder administered in this case, but found nothing to call my attention except that on some grains of wheat were found bacteria, which in our cereals produces inflammation of the mucous membrane of the mouth, eyes, etc., accompanied by fever. I fed my own cattle on the same fodder, and no bad result followed.

The second reports that the animals fed on the ensilage did well until the twelfth day, when they were attacked in a similar manner to those in the preceding account, death carrying off the majority of them.

I have used various kinds of ensilage by way of experiment, and thirty of my cattle have fed thereon during six months, with the best results.

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* Giornale di Anal. Fisiol. e Patol. degli Animali.

Proceedings Veterinary Medical Societies.

MASSACHUSETTS VETERINARY MEDICAL ASSOCIATION.

At a meeting held at Young's Hotel, Boston, March 18, 1884, of veterinary surgeons practising in Massachusetts, it was voted to organize a State Society. There were fifteen gentlemen present, and F. H. Osgood, M.R.C.V.S., of Springfield, was chosen Chairman, and M. Bunker, D.V.S., of Newton, Secretary.

It was voted that the Charter Members shall be composed of graduates of regular veterinary schools, and that such gentlemen shall exhibit their diplomas to a committee hereafter to be appointed, for acceptance.

The following were chosen the committee: J. S. Saunders, D.V.S.; L. H. Howard, D.V.S.; W. Bryden, V.S.; F. S. Billings, V.S.; C. P. Lyman, F.R. C.V.S., of Boston. This committee to call the next meeting. Adjourned.

In conformity to the preliminary meeting, the committee called a meeting at the United States Hotel, April 2d, 1884, with F. H. Osgood, chairman, and M. Bunker, secretary, when they reported favorably in regard to all diplomas presented to them.

It was moved and carried that those of the original members who did not have their diplomas at the meeting of the committee be now examined.

It was also moved and carried that after this meeting no diplomas be examined by this committee.

The committee reported favorably on all diplomas except C. H. Hall's, which was not presented. The committee was then discharged.

It was moved and carried that we resolve ourselves into the Massachusetts Veterinary Association and ballot for President, Vice-President, Secretary, Treasurer and Executive Committe.

The ballot resulted in the election of the following officers: W. Bryden, V.S., of Boston, President; F. H. Osgood, M.R.C.V.S., Edinburgh, of Springfield, Vice-President; J. F. Winchester, D.V.S., of Lawrence, Secretary and Treasurer; F. S. Billings, V.S., of Boston, J. S. Saunders, D.V.S., of Boston, C. P. Lyman, F.R.C.V.S., of Boston, Executive Committee.

It was moved and carried that the Executive Committee draw up a set of by-laws and constitution, to be presented at the next meeting.

It was moved and carried that there be an assessment of one dollar on each member. Dr. Billings was appointed essayist for the next meeting.

THE SECOND MEETING of the Massachusetts Veterinary Association was held at the United States Hotel, May 7th, 1884, and was called to order at 7.45, with W. Bryden in the chair. Eleven members were present. Dr. Billings read a paper and a vote of thanks was tendered him.

Moved and carried that the Executive Committee present the Constitution and By-laws they had prepared, which were adopted as a whole.

Charles Byrne, M.R.C.V.S., W. T. Simmons, M.R.C.V.S., M.D., and Benjamin D. Pierce, M.R.C.V.S., presented their credentials.

F. S. Billings was appointed the next essayist; subject, "Homeopathy: a Contribution to the Code Question."

THE THIRD REGULAR MEETING of the Massachusetts Veterinary Association was held at the rooms of the Medical Library Association, 19 Boylston Place, on Wednesday, June 4th, 1884, and was called to order at 8 P.M., with

W. Bryden in the Chair. There were twenty-three members present. Minutes of the last meeting read and approved.

Dr. Billings' paper was then read, for which, after a few remarks by Dr. Lyman, a vote of thanks was tendered him.

The Executive Committee reported having found the credentials of the following gentlemen satisfactory: T. J. O'Connell, V.S., Lynn; J. M. Skally, V.S., Boston; Chas. Byrne, M.R.C.V.S., North Cambridge; W. S. Simmons, M R.C.V.S., Boston; Benjamin D. Pierce, M.R.C.V.S., Springfield. They were balloted for and admitted.

F. S. Thomas, M.D., V.S., Hanson; A. W. Clement, V.S., Lawrence; J. S. Gardner, D.V.S., Greenfield; J. A. Soule, D.V.S., Hyde Park; J. B. Coleman, M.R.C.V.S., Boston; and J. H. Stickney, M.R.C.V.S., Boston, presented their names for admission.

Dr. Lyman was appointed the next essayist. Subject: "Art. I., Section 1."

THE FOURTH REGULAR MEETING of the Massachusetts Veterinary Association was held in Boston, 19 Boyleston Place, Sept. 3d, and was called to order at 7.45 P. M., with W. Bryden in the chair.

Thirteen members answered the roll call, and the minutes of the last meeting were read and adopted.

Dr. Lyman moved, and it was seconded, that the name of the college from which each member of the Massachusetts Veterinary Association graduated be appended to his name. Carried.

The Executive Committee reported favorably on the credentials of F. S. Thomas of Hanson, W. A. Sherman of Lowell, J. S. Gardner of Greenfield, and Frederick Saunders of Lynn. They were then balloted for, and admitted as members of the Association.

Moved by Dr. Skally that the Executive Committee report upon a by-law to the effect that the reading of the essay follow immediately the reading of the minutes of the last meeting, and also to draw up a regular order of business. Seconded and carried.

Moved by Dr. Lyman that the Society add a *pro tem.* member to the Executive Committee during the absence of Dr. Billings. Seconded and carried.

Dr. Blackwood was nominated and elected a *pro tem.* member of the Executive Committee.

Dr. Lyman made a few remarks upon a case of contagious pleuro-pneumonia he was called to see in Brooklyn, and it was then moved and seconded that he read the report he had prepared instead of the paper on "Article I., Section 1." Carried. After a general discussion of the subject, Dr. Lyman was tendered a vote of thanks for his paper.

Dr. Billings sent in a paper to be opened and read at the meeting, and Dr. Lyman moved that it be referred to the Executive Committee. Lost.

Dr. Lyman moved that the further reading of Dr. Billings's resignation be suspended, for there had been no charges against him as a graduate of a Veterinary School by the Association. Amended by Dr. Osgood that the paper be submitted to those members of the Association appointed by the chair. Amendment carried.

Dr. Lyman moved that the further reading of that paper be postponed so far as the Association was concerned, and proceed to vote on the resignation of Dr. Billings. Lost.

Drs. Bunker, Osgood, and Howard were appointed a committee to report on Dr. Billings's paper.

Dr. Bunker reported that the paper was not necessary for the Association, but his resignation from the Executive Committee made known.

Dr. Billings's resignation from the Executive Committee was then accepted.

Dr. Blackwood was then elected a member of the Executive Committee.

Dr. Lyman, after a few remarks, tendered his resignation to the Massachusetts Veterinary Association.

Dr. Blackwood moved that Dr. Lyman's resignation be not accepted. Seconded and carried.

Dr. Coleman presented his credentials to the Executive Committee, and they were satisfactory.

J. M. Skally was appointed the next essayist. Subject: "Gangrene." Adjourned.

THE REGULAR MEETING of the Massachusetts Veterinary Association, held Oct. 1, 1884, was called to order at 8 P. M., with W. Bryden in the chair.

Nine members answered the roll call, and the minutes of last meeting were read and adopted.

Dr. Lyman's resignation was accepted. It was moved and carried that the chair appoint a committee of three to bring in a name to fill the vacancy of the Executive Committee.

Drs. Simmons, Winchester, and F. Saunders were appointed, and Dr. Byrne's name presented.

Moved and carried that Dr. Byrne fill the vacancy on the Executive Committee.

Dr. Skally read a paper on "Gangrene," and after a general discussion of the subject a vote of thanks was tendered him.

Dr. Blackwood was appointed the next essayist. Meeting adjourned.

THE REGULAR NOVEMBER MEETING of the Massachusetts Veterinary Association was held on the 5th, and called to order at 8 P. M., when the roll was called, twelve answering to it, and then the minutes of last meeting were read and adopted.

The Executive Committee reported an order of business, which was adopted.

Dr. Soule of Hyde Park applied for membership, but the Executive Committee reported unfavorably, and the Secretary was notified to communicate the fact to him. Charles Byrne was appointed next essayist. Subject: "Indigestion."

W. BRYDEN, President.

J F. WINCHESTER, V.S., Secretary.

MONTREAL VETERINARY MEDICAL ASSOCIATION.

The regular fortnightly meeting of the Montreal Veterinary Medical Association was held in the lecture room of the college on the 27th of November, Mr. M. C. Baker, V.S., President, in the chair. There were also present several visitors.

Mr. Wilcocks, of Guelph, Ont., was unanimously elected a member.

Mr. Mayor then communicated a case of Flatulent Colic which came under his notice last summer, and which was treated successfully by the operation of Enterotomy.

A discussion followed as to the advantages to be gained by following this plan of treatment, and also the danger run, but it was agreed that in bad cases it was the most successful treatment.

Mr. E. Wallis Hoare then read his paper on "Observations on the Examination of Horses as to Soundness." He described the difference between legal and practical soundness, and how, in the present day, the question of practical soundness was very important. He next described the method of examining for soundness, taking that adopted by the late Professor Dick. He also noticed the various defects likely to be met with, dwelling especially on the subject of spavin and the so-called coarse hocks, showing that a great deal of dispute frequently arose as to the question of the soundness of hocks.

The importance of testing for lameness and for the wind was dwelt on, and the advisability of removing the shoes in examining the feet for corns. The requirements of the examiner were also noticed, which were stated to be a thorough knowledge of the conformation of the horse, and quickness in observation and perception, so as at once to detect abnormalities. The importance of practice in this part of the profession was urged, as it was impossible to be proficient in it by mere learning out of books.

The importance of the veterinary surgeon being able to ride was dwelt on, especially if he practices in a district where many hunters or saddle horses are bought and sold, because many defects in action, etc., are noticed when the animal is ridden by the examiner himself.

A discussion followed as to the necessity of making such a thorough examination in all cases, but the essayist contended that without such an examination it was impossible to give a proper opinion on the horse.

The question of spavin and coarse hocks was also discussed, and the reasons why spavins situated far back on the hock were not so liable to cause lameness as those situated in front and outside.

After a few remarks by the President, the meeting then adjourned.

At the next meeting Mr. Clement, V.S., will communicate a case of Excision of a Cystic Tumor from the neck of a horse, and Mr. Lambe will read a paper on "Horse-shoeing."

E. W. Hoare,
Dec. 3d, 1884. Member of Reporting Committee.

CORRESPONDENCE.

To the Editors of the Journal of Comparative Medicine and Surgery:

Gentlemen—The communication in the last issue of your journal relative to the Columbia Veterinary College has been brought to my notice.

In reply I would say that from papers presented to me at the time of the transfer to the American Veterinary College of all the privileges and charter of the Columbia, including resignations, resolutions, etc., there is no doubt as to the final extinguishment of that institution, and that an attempt to re-establish the institution, or to re-invest it with corporate powers on the part of those who have pretended to do so, will, if persisted in, pave the way to serious complications, and result in discomfiture to any one attempting to continue in such a course. I shall be pleased to show you the proofs of the above statement, and hope to satisfy you of the veracity and propriety of our action in the matter.

Respectfully yours,

SAMUEL MARSH,

President American Veterinary College.

To the Editors of the JOURNAL OF COMPARATIVE MEDICINE AND SURGERY:

GENTLEMEN—Among the many institutions calculated to advance the interests of the profession of veterinary medicine, veterinary societies hold a high place. I have always considered it to be the first duty of the veterinarian to devote his attention particularly to their establishment, and I have myself attempted several times to form one, but without success. The cause of failure has been that the members wish to be all officers and no soldiers. Self-interest is their principal aim, and the result is that, after a few meetings, the affair aborts.

Now, if our brethren, in forming their associations, would elect their officers promptly and then proceed to the main business, namely, the writing and reading of such cases of interest as they meet with in their practice, and the discussion of them by the members, they would be doing a great work, not only improving their own minds, but also promoting the advancement of the profession.

Great care should be taken in accepting candidates for admission, as in no other profession is there such a number of rascals, and my opinion is that more good can be accomplished by a few good than by a large number of indifferent members.

Very truly yours,

H. E. EARL, V.S.

West New Brighton, Staten Island, N. Y.

REVIEWS.

A TEXT BOOK OF OPERATIVE VETERINARY SURGERY. By George Fleming, LL.D., F.R.C.V.S., with numerous illustrations. London: Ballière, Tindall & Cox, 20 King William street, Strand. New York: William R. Jenkins. Part I, pp. 266.

Anything from the pen of the well-known editor of the *Veterinary Journal*, particularly when dealing with an at once practically important and yet neglected topic, is certain to come before a large class of readers. For this reason it might be expected that we would devote some space to pointing out its good features, expatiate on the debatable ones, and criticize the faults and omissions if there be any. But really there is little room, either for special encomiums or censure. The plan of the work is simple and its scope limited, and the author does not claim to have exhaustively treated the subject. That in nearly every scientific respect the book is inferior to the continental treaties of DEGIVE, HERING, and TOUSSAINT-PEUCH, is evident on superficial examination; but it would be difficult to find anything superior to it in the English language. Its excellences are such as characterize English literary productions as contrasted with the German. The latter are, if more elaborate and philosophical, also more obscure, involved and sententious. Fleming's work is clear, written in a fair style, and shows that its author possesses admirable facilities for condensing matters for the student. It is not a very flattering reflection, regarding the *status* of Anglo-Saxon veterinary medicine, but it is not the less a true one, that these very qualities guarantee the success of the book. It is just the thing the American student requires.

In speaking of the general preliminaries of operations on animals, such as the method of securing them, the author exhibits a humanity which is in pleasant contrast with the jockey spirit so often assumed and then developed into an unconscious habit, by those who seek to cover their ignorance or inexperience under a show of *brusque* self-confidence.

The description of the methods for "throwing" horses is brief and complete, and Professor Fleming demonstrates his largeness of mind by incorporating descriptions of Farmer Miles' method, who, although an American, was abused and libelled by a domestic clique, and compelled to cross the Atlantic to secure recognition of his new and valuable additions to surgical procedure. The section on the dangers to which horses are liable when thrown, is bodily extracted from Professor Dieckerhoff's authoritative article on the subject.

We do not feel inclined to be finical, and the fault we are about to refer to—if it be so regarded by others—is a common one in human and veterinary surgical text books, but is it not really high time that wood cuts illustrating how the knife is to be held and text detailing it, be banished to make room for more necessary and useful material? Do not let us be misunderstood here! To hold a knife correctly is the very letter A of surgery, but the man who does not instinctively hold his knife right, or who has not learned how to use it in the dissecting room, has mistaken his profession, and all the wood cuts in the world will not help him. Then, it is impossible in a textbook to illustrate all the devices which the surgeon is called on to make on the spur of the moment.

As far as we can judge from the fragment of the work before us, its great defect is in the field of topographical (that is true surgical) anatomy. The anatomical descriptions and drawings are acknowledged to be taken from the author's translation of CHAUVEAU. Now, Chauveau is an excellent anatomical treatise, but it deals rather with systemic and comparative than with surgical anatomy. Professor Fleming would have found in the German Atlanti much better models and such as are suited for his purpose. We regret that he has not shown more independence of precedent here.

We await the second part of the work with interest. The publishers have done their part of the work well. E. C. S.

THE ART OF TAMING AND EDUCATING HORSES. By D. Magner. Pp. 1088; with 900 illustrations. Battle Creek, Mich.: Review & Herald Publishing House. 1884.

This ponderous—and some hypercritical persons might say nondescript—volume is evidently the product of gradual evolution. The intentions of the author were evidently excellent, and he has succeeded in carrying them out fairly well in some directions; in others he has hampered himself considerably by exercising less discretion and good taste than his best friends would wish him to have shown.

It seems that Mr.—or, as he styles himself (on the same principle that the washerwoman in Nicholas Nickleby might have styled herself a professor of the lavatory art, because she "professed" to use a mangle), Professor—D. Magner has practised for many years a method of taming wild and vicious horses as a secret; that he has been in the habit of teaching this method to classes formed in every part of the Union, as a secret, and that now he has concluded to make the said secret public. So far so good. No one will censure Prof. Magner for thoroughly reaping the financial harvest first, and then establishing his claims to literary priority by killing the goose when she would lay no more golden eggs.

In addition to publishing his method of taming horses, he publishes chapters on shoeing, diseases of the foot, and the more common surgical and internal diseases of the horse. These chapters of the book are in part the work of three well known veterinary surgeons, formerly editors of the *Veterinary Gazette*, Drs. Hamill, Meyer, and McLaughlin.

Composed of such heterogeneous material, and being the work of so many hands, this book exhibits many shades of merit. The work of Prof. Magner's veterinary associates is of a higher order than the rest of the book; that on shoeing, for example, contains citations from Hamill which have not been elsewhere published, and some from Prof. Fleming, which conjointly constitute as thorough a disquisition on the subject as we are acquainted with. The illustrations of this part are very elaborate, and Prof. Magner has evidently spared no expense in making them as attractive and true to nature as possible. The chapter on the diseases of the foot is equally well written, and nearly as well illustrated. That on the physiology of the circulation, which introduces the subject of internal diseases generally, is also up to the times. A strange error mars the upper figure reference on page 740, where the natural pigment corpuscles of the skin of a frog's web, are named "spots of congestion," produced by "alcohol."

The division of the work which bears the impress of Magner's original work relates to the method of subjugating horses alluded to in the opening, and includes an account of over forty cases of wild, vicious, or stupid horses which he has tamed, and interspersed here and there are illustrations showing how the horse looked "before taking" and "after taking"—somewhat on the principle of "Wolcott's Pain Annihilator," "Laird's Bloom of Youth," etc. The reader will recollect advertisements in which two faces are shown, the first with sunken cheeks, a bald head, villanous leer, disgusting secretions running from every cavity, and pustules "all over"; the second represents an attractive Venus, who was supposed to be metamorphosed from the disgusting creature shown in the first picture, by the use of the magic remedy advertised. Prof. Magner's woodcuts, in like manner, exhibit the forty horses, rearing, kicking, plunging, eating people, jumping over hay-carts, etc., in the first act, and quietly carrying Prof. Magner, pulling Prof. Magner, looking at Prof. Magner with fond eyes, or cringing before his stare, in the second act. Prof. Magner does not inform us whether these cuts are from instantaneous photographs or not. If they are, they might have some convincing value. As it stands, they seem to have none.

Numerous testimonials from horsemen, clubs, and clippings from newspapers, lauding Prof. Magner's achievements, are strewn through these chapters, evidencing that the great horse-tamer is not inclined to hide his light under a bushel.

Briefly, Magner's methods are three: the first consists of throwing the horse, the second is bringing his head and tail close together and keeping them fixed, the third, and to us the most novel as well as debatable method, is the production of pressure on the medulla oblongata, through the soft parts overlying the membrana obtruatoria. We will inform Professor Magner that it is not likely that he succeeds in accomplishing what he thinks to be the object of this method. It is not as easy as he seems to believe to effect pressure on so deep an organ except by altogether inadmissable means. The real action of this method seems to be on the same principle as the subjugation of the horse when castrated standing, by producing a powerful impression on the peripheral nervous system. Should he really effect such phenomena as making the horse "look as if he were going to sleep, pant and break out in perspiration," he would have produced an effect on the nerve centres or the pneumogastric nerves which it would not be safe to prolong or to repeat. In that event we should hear of blind staggers as a not infrequent result of the application of the pressure method.

The principles announced as governing the methods of subjection are excellent, and the illustrations of the different dispositions of horses are as good as the woodcutter's art can render them. We object, however, to the pictures of human beings, illustrating dispositions in horses, and which are really nothing more nor less than temperance sermons in disguise. The only human picture that is at all relevant, is the frontispiece representing Prof. Magner himself, who would doubtless attain his ardent ambition of being considered a great man much better if he had had self-denial enough to suppress this thing. His picture represents him as a fair-looking, good-natured and shrewd man, and we are happy to make his acquaintance *in figure*, but we know of many who will cavil at it.

In his title the author announces recipes for remedies which had long been sold as secrets. Those published by him in the back of the volume are, as we use to say during the war, not worth a continental shinplaster. In justice to his able and accomplished co-workers, Prof. Magner should have omitted this discreditable addition, even if he had not recognized its impropriety on every other ground. There is also a too palpable tone of advertisement throughout the volume which, in some places, goes far beyond the limits of good taste.

Excluding the features above adverted to, and which for many of his readers will not constitute serious disadvantages, we think that we can cordially recommend it to horsemen, farmers, stock-breeders and others interested in the management of the horse, as containing many sound reflections, valuable hints and interesting facts. It constitutes a good common-sense, domestic reference book for those who have a stable or who are compelled to handle horses.

E. C. S.

QUARTERLY REPORT OF VETERINARY PROGRESS. By J. H. Steel and F Smith. April, May, June, 1884.

This little pamphlet devotes its twenty-eight pages to the recent advances made in medicine and surgery, in so far as they are of interest to the veterinarian, giving a synopsis of the principal veterinary and medical periodicals published at the present time, and placing before the reader a concise statement of the work performed in the last three months by our profession throughout the world.

Anthrax, glanders, rabies, tuberculosis and scarlatina receive special attention, and the labors of Pasteur, Koch, Chauveau, Bouley, Billings, Stickler and Law are referred to.

Extracts from the French, German and Italian journals are translated. To the veterinarian the pamphlet will be invaluable, giving him, as it does, a clear summary of what otherwise could only be obtained by the careful poring over many hundred pages of periodicals, and saving him the great expense incurred therein.

CONTAGIOUS DISEASES (ANIMAL) ACT, 1878, Dublin, Ireland.

The report of the Council for the year ending 1882 contains the provisions of the Act and Statistics, showing the results of contagious or infectious diseases as per return of local authorities.

The Act defines the duties of the authorities and veterinary surgeons in each disease separately, giving comprehensive directions as to notification, movement into and out of infected districts, slaughter, compensation, disinfection, quarantine, etc.

The Report also contains a number of forms for the use of Inspectors, declarations, licenses, etc., which will be of value to Veterinarians.

ANNALS OF SURGERY. A Monthly Journal devoted to Surgical Science and Practice. Edited by L. S. Pitcher, M.D., Brooklyn, N. Y., and C. B. Keitly, F.R.C.S., London, Eng. 1885.

The publishers announce that the first number of this journal will be issued this month. Judging from the high character of its predecessor, the "Annals of Anatomy and Surgery," we predict for our readers a scientific treat in the appearance of this journal.

The price will be $5 a year, and 50 cents a number.

BOOKS AND PAMPHLETS RECEIVED.

R. SCUOLA, SUPERIORE DI MEDICINA VETERINARIA DI MILANO. Milan, 1884.

EXPLANATION OF THE PATHOLOGY AND THERAPEUTICS OF THE DISEASES OF THE NERVE-CENTRES. By I. McF. Gaston, M.D. Atlanta, Ga., 1884.

THE DRY TREATMENT OF CHRONIC SUPPURATIVE INFLAMMATION OF THE MIDDLE EAR. By Prof. Charles J. Lundy, M.D. Detroit, 1884.

MURIATE OF COCAINE IN OPHTHALMIC SURGERY. By Charles J. Lundy, M.D. Detroit, 1884.

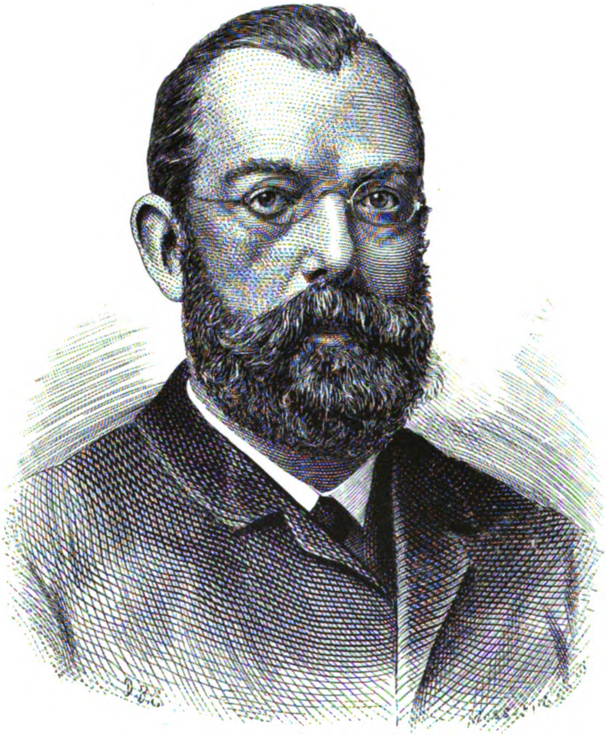
PHYSICIANS' VISITING LIST FOR 1885. Published by P. Blakiston, Son & Co., Philadelphia.

REPORT OF THE BROOKLYN COMMISSIONER OF HEALTH, December, 1884.

JOHNS HOPKINS UNIVERSITY CIRCULARS.

ANNALS ET BULLETIN DE LA SOCIÉTÉ DE MEDICINE DE GAND.

JOURNALS.—La Clinica Veterinaria, Milano. The Veterinarian, London; The Veterinary Journal, London; Der Zoologische Garten, Frankfort; Schweizerisches Archiv fur Thierheilkunde, Zurich; Archiv fur Wissenschaftliche und Praktische Thierheilkunde, Berlin; Wochenschrift fur Thierheilkunde und Viehzucht, Augsburg; Tidskrift for Veterarin-Medicin, Stockholm; Journal de la Société contre L'Abus du Tabac, Paris; Giornale di Anatomia, Fisiologia e Patologia, degli Animali, Pisa; La Cronica Medica, Valencia; Kansas City Review of Science and Industry; The College and Clinical Record, Philadelphia; New England Medical Monthly, Sandy Hook; Nashville Journal of Medicine and Surgery; The Southern Clinic, Richmond; The Western Medical Reporter, Chicago; Journal of Cutaneous and Venereal Diseases, New York; Denver Medical Times; The St. Joseph Medical Herald; The Weekly Medical Review, St. Louis; The Blacksmith and Wheelwright, New York; National Live Stock Journal, Chicago; The Breeder's Gazette, Chicago; Cultivator and Country Gentleman, Albany; Weekly Drover's Journal, Chicago; The Chicago Tribune; Horseshoer and Hardware Journal, Chicago; The Polyclinic, Philadelphia; Medical World, Philadelphia; American Veterinary Review, New York; Atlantic Journal of Medicine, Richmond; Indiana Farmer, Indianapolis; Texas Courier Record, Fort Worth; The Jersey Bulletin, Indianapolis; American Journal of Ophthalmology, St. Louis; Pacific Medical and Surgical Journal and Western Lancet, San Francisco; New York Medical Journal; The Quarterly Journal of Veterinary Science in India; Hearth and Home, Washington; American Liveryman and Horseowner, Chicago; American Psychological Journal, Philadelphia.



ROBERT KOCH.

THE JOURNAL

OF

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VOL. VI. APRIL, 1885. No. 2

ORIGINAL COMMUNICATIONS.

ART. IX.—ROBERT KOCH,

THE CONDUCTOR OF THE GERMAN CHOLERA COMMISSION.—HIS METHOD OF BACTERIA CULTIVATION.

BY PROF. DR. ALBERT JOHNE,
of the Royal Veterinary Institute, Dresden.

(*Written especially for the* JOURNAL OF COMPARATIVE MEDICINE AND SURGERY).

There are few among the names that give lustre to the horizon of scientific research which shine with greater brilliancy than that of the world renowned investigator in the field of bacteriology, especially with reference to cholera, "Geheim Regierungsrath," Dr. Robert Koch, who is also an active member of the Imperial Board of Health of Germany. It cannot but be of interest to the readers of the JOURNAL to learn something of the life of Koch, after having been favored with a sketch of that of his great French contemporary Pasteur in the last number.

Koch was born at Clausthal (in the Hartz Mountains) in the year 1843, and studied medicine from 1862—1866 at Göttingen and Berlin. In the summer of 1866 we find him acting as assistant at the General Hospital of the City of Hamburg; from thence he began the life of a general practitioner, first at

Langenhogen, in the vicinity of Hanover, and later at Rackwitz, in the Province of Posen, and finally in a small city known as Wallstein in the same Province. In 1872 he was appointed to the position of "Kreis-physicus" for the last named locality. Here in Wallstein Koch laid the foundation of those researches which threaten to almost revolutionize many of the ideas of General Pathology, and this while busily engaged in a constantly augmenting practice which was largely surgical in its character.

Here it was that he made those detailed studies into the etiology of anthrax and the biology of Bacillus Anthracis—"Cohn. Biologie der Pflanzen," II. p. 277—which revealed to us almost the entire life-history of this parasite; although it had been familiar to observers for nearly a quarter of a century. By means of Koch's investigations in this direction, we have become enabled to more successfully combat the extension of this fell disease among our animal population. Not content with such brilliant success in one direction, our investigator at once sought for other fields in which to make himself useful to humanity, and we find him busied in those wonderful researches, with which we are all now so familiar, upon disease as caused by infection from wounds. (Etiology der Wound-infections Krankheiten, Leipzig, 1876.) In these studies he confirmed the observations made by Klebs, Recklinghausen, Waldeyer and Birch-Hirschfeld, with reference to the occurrence of micrococci in connection with pyæmia and puerperal fever, as well as in pyæmia in the rabbit, and also in other accidental diseases of traumatic origin among animals, progressive necrosis of the tissues, progressive development of abcesses, septicæmia and erysipelas in rabbits, and the disease which has become somewhat noted through these researches, septicæmia in the mouse. By direct experiment he proved that all these diseases were due to the direct introduction of micrococci into the organism, thus giving direct scientific proof to the conclusions which Mr. Lister has so ably drawn from and supported by practical experience.

It was but natural that work of such an exact and scientific character, as well as great practical importance, should finally attract the attention of the medical world, as well as the government, to the humble "Kreis-physicus" at Wallstein. In

1879 Koch was promoted to "Physicus," and removed to the more favorable city of Breslau, but the circumstances here do not seem to have suited him, for he soon returned to his former residence, fortunately, however, but for a short time. In 1880 he was made an ordinary member of the Imperial Board of Health, of which we can truly say he has been the most important member, as well as worker.

Since his connection with this important branch of the government we have become familiar with a succession of the most brilliant researches in the field of Preventive Medicine which ever issued from the brain and hands of mortal man, as may be seen by reference to the two volumes issued by the Board under the title of "Mittheilungen des Kaiserlichen Gesenedheitzamtes, 1881-3." In the first volume the reader is introduced to the peculiar method of bacteria culture, which have been developed by the master of this art in his contribution with reference to the "Pathogenetic Organisms," especially in his detailed investigations into the etiology of anthrax, as well as in his studies into the action of disinfectants and germicides made in connection with Wolfhugel. However important these researches may have been, they were but the pioneers that led the way to that discovery which at the time did more to extend Koch's reputation over the world than all his previous work, viz., his researches into the nature of tubercle-virus and the discovery of the bacillus of phthisis. This discovery at first gave rise to the most bitter opposition from various directions, many deeming it absurd or impossible, but when observers became more thoroughly acquainted with the exactness of Koch's method and began to practice it themselves, one objector after another gradually yielded to the supremacy of the greater master, as evinced in his classical contribution to the "Etiology of Tuberculosis," in the second volume of the "Mittheilungen" above mentioned. Scarcely had the excitement begun to quiet down, which the previously considered contributions had made in the minds of both professionals and laity, before Koch again convulsed the world with another discovery, which for the time appears to have absorbed the attention of the whole thinking world, especially of that part of it which is interested in all questions of great public importance.

The government of Germany had selected Koch to conduct the commission which were to proceed to Egypt and India in order to make investigations into the nature and cause of Asiatic cholera. To the enthusiastic zeal, as well as to the simple and yet practical methods of cultivation and research which owe their discovery and completion to Robert Koch, is due the discovery of that most noted parasite, the comma bacillus, which he looks upon as the cause of cholera. It is well known that this discovery has also had the effect of creating as much scepticism and opposition on the part of other observers as was the case with the bacillus of tuberculosis. One can assuredly express the conviction that the same fate will follow Koch's opponents in connection with the comma of cholera, as has been the case with regard to its relation in tuberculosis. In fact, the masterly manner in which he demonstrated and refuted the errors of Finkler and Prior should never be forgotten by those who are busied in the field of bacterial research.

To those whose fortune it is, or has been, to stand in such intimate relations with Koch as to become acquainted with the sceptical criticism to which he subjects all his own work, as well as with the painful exactness of his methods of observation and experiment, it is evident that the contradictory assertions of other observers must be due to insufficient acquaintance with the methodic process of bacterial culture on, or in, solid media.

The discovery and completion of these methods are of themselves sufficient to give the name of Koch a place in the immortal wreath with which Science has graced the world. By means of the same it has become possible for us to search with some degree of certainty for those microscopic fiends which lie at the bottom of many of the most fatal diseases of both animal and vegetable life. I can, therefore, assume that the readers of this JOURNAL will be interested in becoming somewhat better acquainted with the outlines of these methods.

In order that we may assume that a given disease, or disturbance, is due to some micro-organism, it is necessary,

1st. That we find in every case of a like nature an organism having exactly the same morphological characteristics.

2d. That it is possible for us to securely isolate said organism and to cultivate and produce it in the same form, in some artificial media, though several generations outside the organism in which it was first discovered. Only in this way can we be sure that we have finally secured a cultivation absolutely free from any other contaminating material.

3d. We must be able to produce the same disease in an animal selected for the purpose, by means of such a pure cultivation, as the animal from which we procured the original material was afflicted with.

In illustration of the above I have only to mention that Koch has carried cultivations of tubercle bacilli through thirty-four generations outside the animal organism, extending over a period of twenty-two months, and that he was still enabled to produce tuberculosis in a suitable animal at will by inoculations with minimum quantities of said "culture-material," with the same certainty as when the bacilli were first cultivated.

The successful carrying out of any of these conditions is by no means an easy matter in every case. Especially will it be found a question of great difficulty with reference to the first two, when the diseased parts stand in more or less open connection with the outside world, such as the skin, the respiratory, digestive, urinary or sexual organs; in such cases, numerous adventitious micro-organisms must, of necessity, be present, and the certain isolation of such as may have specific characistics in a questionable case will not be by any means an easy task.

In all such cases, the first task will be the isolation of each individual form of bacterial life, and then to consider and examine them each under the microscope. Before Koch discovered and perfected the method of cultivation by solid media, it was next to an impossibility to successfully isolate the micro-organisms found so frequently infesting diseased organs or tissues. Almost the entire discredit into which the whole doctrine of the pathogenetic fungi has fallen during the last few years must be attributed solely to the failures connected with the previous ways of making investigations into their forms and modes of life which led to erroneous conclusions and unfruitful hypotheses.

It was formerly the custom, and is now, with many observers, Pasteur, Zopf, Nageli, *et al.*—to use fluid media in their cultivations of micro-organisms, such as bouillon and other suitable material, which had been prepared by cooking a sufficient number of times; in this manner all adventitious germs which were previously in the medium were supposed to have been killed. Then was introduced into this fluid a small portion of the suspected material, and in a suitable temperature it could be seen that great quantities of something developed, which, on microscopic examination, were found to belong to germ life. When it accidentally happened that the infectious material—blood, pus, or tissue—contained but one variety of micro-organisms, then it is natural that the cultivating medium, though fluid, would contain but this one form, always providing no other gained access to it during the process of inoculation. This has not generally been found to be the case, however, when fluid media have been used, the same being most frequently found containing a variety of forms of germ life, one form predominating over another according as the conditions of temperature, etc., favored this or that variety. It is evident that experiments made upon animals with pure (?) material gained in this way would be most uncertain and variable in their results. It must be still further borne in mind that in opening and closing the test tubes containing such fluid cultivations, the atrium was given to the entrance of many foreign varieties of germs from the air which could of themselves develop if the conditions were favorable. It was even possible, and not unfrequently probable, that such media could thus acquire pathogenetic properties which it did not possess before the medium had been opened to the free influence of the external air.

This variation in the forms of organisms present in such cultivations led many otherwise most clever observers to the mistaken conclusions that there was but one original, or primary, form of bacterial life, and that there was no such thing as constancy in either their bio- or morphological characteristics among the lower fungi; and that the variation in these directions under which they appeared, were due to variations in the nature of the cultivating media, temperature, etc., and further, it was asserted that a mass of such organisms which to-day were proven to be perfectly harmless could, under change in the above condition, assume on the morrow the most violent pathogenetic characters. The most noted advocates of this idea have been Nageli, Zopf, and Buckner. The views and teachings of Zopf, which are indeed of a most philosophical yet hypothetical nature, may be found in his work on "Die Spaltpilze." They have lately been subjected to a most searching criticism by Flügge of Göttingen in the "Deutsche Medicinische Wochenschrift," 1884, No. 46.

These views with regard to the Polymorphism of the fission fungi have always found an active and determined opponent in Koch. By means of the solid media for the cultivation of these fungi introduced by him, it has been possible to absolutely determine the constancy in form of the organisms in question with the same exactness possible in organisms of a higher type, as soon as we have them before us in the shape of pure cultivations. The contradiction between fluid and solid media is to be sought in the fact that in the first the individual bacteria move about, either actively or passively, through the medium, the separation, or fixing, of the single varieties being thus impossible, while in solid media each individual germ becomes fixed on one locality, from which new individuals develop according to their kind, in the immediate vicinity of the original individuals of their own species, thus forming colonies having exactly the same bio- and morphological characteristics. Each of these colonies retains its individual characteristic so long as it does not become mixed with those in its vicinity, either through progressive development, or too close proximity one to another, or become polluted by adventitious germs falling from the air on removal of the covering glasses. In order to obtain isolated cultivations from any desired material it is only necessary to disperse its individual elements widely enough apart in the cultivating gelatine and to protect the latter from the air.

The following methods are those adopted in the laboratory of the Imperial Board of Health in obtaining pure cultivations of bacteria :*

Koch recommends what he has called "Fleisch-wasser Pepton-gelatine" as the most convenient and general medium for the cultivation of the majority of the pathogenetic fission fungi in the ordinary temperature of our rooms, say 17-19° C. For other germs, which require a higher temperature for their development, say blood-heat, by which the above-named gelatine would become fluid, instead of gelatine, Hesse has recommended an alga, known in Germany as "Agar-Agar"; such a gelatine remains tolerably solid even at a temperature of 40° C. One can prepare meat-water Peptone-gelatine in a simple manner, as follows:

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* These methods have been described in detail in a brochure by the author, entitled "Uber die Kochschen Reinculturen und den Cholera-Bacillus." Leipzig: 1885.

Take 250 grammes of finely-hashed lean beef, and add to it 500 grammes distilled water; the same must be placed in an ice-chest, or in the winter in a cool place, and allowed to stand for twelve to twenty-four hours; it should then be thoroughly stirred up and filtered through a fine cloth; if the fluid received does not amount to 400 grammes, sufficient distilled water must be added to make it equal; to this fluid we add 4 grms. Peptonum-siccum (must be pure) 1 per cent.; 2 grms. cooking salt, 1-2 per cent., and 40 grms. of the very best and clearest cooking gelatine, and allow the whole to stand in a vessel for about half an hour until the gelatine has become softened. The mass is then to be put into a flask and thoroughly warmed in a water bath—a common kettle will do in case of necessity—until the gelatine has become completely dissolved, but not sufficiently to cause coagulation of the albumen contained in the meat-juice; the mass must then be neutralized, it having an acid reaction, by the addition of a saturated solution of pure carbonate of soda, so that very sensitive blue litmus paper will not be changed, and red but very slightly to a delicate blue color.

This is a part of the procedure that requires the greatest circumspection in the preparation of such a gelatine for the cultivation of the comma of cholera asiatica, which will not develop in either an acid or strongly alkaline medium. In the case of the majority of known fission fungi this delicacy of the alkaline reaction is not so necessary, many of them growing luxuriantly in media having a strong reaction of this kind. This reaction, when too strong, can be readily corrected by the addition of a slight quantity of lactic acid.

The deportment of bacteria to different cultivating media is often of much diagnostic value, as many of them grow in a peculiar manner in a medium of known specific reaction. This can only be ascertained by experience.

To return to the preparation of our gelatine material:

The gelatine having been dissolved in a moderate temperature and the reaction corrected, the mass is again placed in a water-bath, the heat increased gradually, and the whole cooked for from one-half to a full hour, until the albumen has been entirely precipitated (this can be readily proven by filtering a small amount of fluid into a test tube and heating it over the burner; if no further precipitation takes place the mass has been cooked enough).

The fluid now loses its redness and becomes slightly straw-colored. The reaction of the mass should be again taken. The whole must now be carefully filtered while hot, in small quantities, great care being necessary not to burst the paper. If the quantity prepared is large, one can place several filters at work at the same time. The filtered fluid should have a clear topaz yellow color, and be at once placed in test tubes which have been previously sterilized, test tubes being filled about one-third. Care must be taken not to touch the mouth of the tubes with the fluid, for on cooling it will cause the cotton plugs to adhere. These tubes must be heated to cooking for about fifteen minutes daily for four or five days, in order to be sure and destroy any germs that may still be present and capable of developing. This can be done either wholesale, by placing the filled tubes in some tin vessel, and then in a bath filled with cold water, which must be heated to boiling; or by heating each tube over a Bunsen burner, care being taken not to cause the fluid to ascend against the cotton, or to boil up so as to form bubbles, or that the tubes dance up and down in the vessel so as to break their bottoms.

These procedures having come to completion, our gelatine is ready for inoculation. To this purpose the gelatine in a test-tube is to be slightly warmed, just enough for it to become fluid. We next take an inoculator, or piece of platinum wire fixed in a glass handle, and heat it to a red heat in a burner, allowing it to cool on touching the point of it into pus, fæces, or any material we suspect as containing malignant or any desired germs, and dip the point into the gelatine, after which we replace the cotton plug and shake up the fluid, in order to disperse the inoculated material through it; we then warm another test-tube in the same way, and after sterilizing our inoculator as before in the gas flame, we introduce it into tube No. 1, and then inoculate tube No. 2, this time four or five times, then shake up its contents. We go through this procedure at least three times, and in this way widely disperse the germs through the medium for cultivation. The gelatine of the last tube is then carefully poured out upon a piece of ordinary window-glass, cut to an appropriate size and previously sterilized. This is placed in a glass dish, in the bottom of which is a piece of moistened blotting-paper, said dish having been previously sterilized; by the above inoculative procedure the germs have been so dispersed through the gelatine that when it cools and hardens on the glass plate, which, being at once covered in the dish, removes all danger of contamination from the air, each germ becomes fixed and isolated where it was at the time the gelatine was poured on the glass, and multiplies at this point, and this only into a colony. Should any germs have accidentally fallen upon the plate while the cover of the dish was off, they also remain fixed, and grow only as an individual cultivation in the place where they fell. The dish is then to be placed on one side and things left to take their natural course.

In one or two days we can see the minute colonies which have developed, with the naked eye; each of these contains but one variety of germ; each has its peculiar kind of development and presents form or color peculiar, more or less, to itself. Some of these bacteria are odorless, while others yield a most offensive smell when the cover of the dish is lifted; others cause the gelatine to become fluid, while others look like dry scales or deposits upon, or in it. If from such an isolated colony, which by microscopic examination we have found to be formed of but one variety of bacteria, we inoculate a test tube, as previously mentioned, and disperse the germs through the warmed gelatine, and then pour this out upon a glass plate as before, we than have growths, or cultivations, dispersed over the surface of the glass, each colony of which consist of one and the same variety of bacteria from both a bio- and morphological point of view. If on the other hand we do not wish to make plate cultivations, but to observe the manner of development of a given bacteria in the solid medium in a test tube, we touch the desired growth upon the plate with the point of the previously sterilized wire, and then, carefully removing the cotton plug from a test tube (which we hold mouth down so that nothing can fall into it from the air, an advantage only offered by solid media), we quickly introduce the glass staff and wire into the tube, pushing the wire into the gelatine or touching its surface—the first is known as a "Stich or puncturing-culture." In this way we are enabled to inoculate from one tube to another as the bacteria consume or destroy the gelatine and thus carry on our cultivations through endless generations, if we desire, the last being exactly like the first, if there are no adventitious germs present. In some cases, while the bacteria suffer no changes either of a bio- or morphological character, they do in their physical attributes, such as weakening in power or virulence, as they pass through so many generations of pure cultivation outside of any animal organism. Bacillus anthracis is illustrative of this peculiarity. By means of this serial cultivation we get the material necessary to the perfection of the last link in the chain of bacterial experimentation; viz., to find out as to the infectious or pathogenetic characteristics of any given germ; *i. e.*, to prove whether it is indeed *the* cause of the disease or processes in question.

By means of these procedures, as previously mentioned, it has been possible for Koch to completely contradict the theory of the polymorphism of bacterial life, and to prove the doctrine that constancy of species is as true of bacterial as it is of human life. Bacillus anthracis can only be produced from its like, and in its turn produce its like, as man can come from and only produce man. This is sufficient to demonstrate the great practical importance of the methodic process perfected by Koch, over that of fluid media, no matter by whom advocated. It needs no arguments to prove that it is the only method upon which we can certainly depend to procure pure cultivations, and to retain them in this condition through any desired number of generations.

The value and importance of these facts are:

1st.—The nature of the medium, or substance, which offers a favorable ground for the growth of any individual variety of bacteria.

2d.—The ability to thus isolate and study it in all its characteristics.

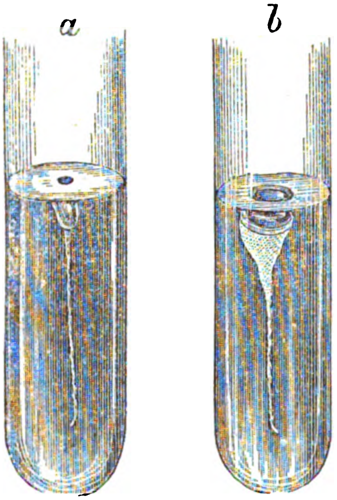
3d.—The fact that they suffer changes in their physical characteristics, as has been shown, or better indicated by Pasteur for quite a number of germs.

These, and other facts yet to be ascertained, all go to show the great value of Koch's perfection of solid cultivating media, both for the treatment and prevention of contagious and infectious diseases. It should here be mentioned that by means of his simple method, Koch was enabled to show that the bacillus which Prior and Finkler discovered in the evacuations of cholera nostrus, and which they claimed to have cultivated in a pure form, and to be similar in all respects to that discovered by Koch in cholera asiatica, was not, in their cultivation, a single germ, but rather that these observers had been cultivating a mixture containing four varieties of bacteria, each havingdistinct morpho and biological characteristics, to show the great difference which existed between the comma found by him in cholera asiatica and that really existing in the cultivations from cholera nostrus by Prior and Finkler. As to the morphological variations between these two commata, it is not to be denied that when embedded in Canada balsam, they present a very close resemblance; but this apparent correspondence vanishes when the practised observer examines freshly colored specimens at once in water, with the same microscope and same power. It can then be easily seen that the comma of Koch is exceedingly thin and delicate, while that of Finkler is larger and thicker—that is, more plump. If, on the contrary, we should admit that morphologically the two varieties presented no ascertainable differences perceptible with our present means of ocular examination, still it does not follow that the biological conditions should so closely correspond. any more than that the chemical characteristics and action of a sweet and bitter almond should be the same, no matter how nearly alike the outside appearance may be. Notwithstanding this apparent morphological similarity between the Koch and Finkler commata, their biological phenomena are essentially different.

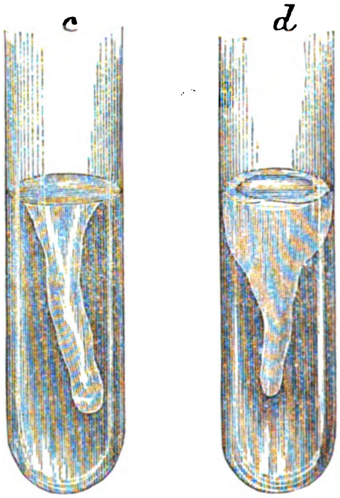
The comma of Finkler and Prior demonstrates much greater activity in proliferation, under like conditions of cultivating media and temperature, than that of Koch. When cultivated in gelatine upon the glass plate, the single colonies of the Finkler and Prior comma present a fine granulated appearance when examined by a low power under the microscope, and one of a homogeneous round form and have a distinctly yellowish brown color; they also cause the gelatine to become fluid very quickly and develop a most penetrating and intensively unpleasant odor in the vessel used for cultivating them, so that in from twenty-four to thirty-six hours they have sunk deeply into the substance of the gelatine, and caused quite an area of fluid degeneration in the vicinity of each colony. The colony soon loses its finely granulated and circumscribed appearance, becoming very irregular in form. It causes fluid-degeneration of the gelatine so rapidly that in the course of two or three days the whole mass upon the glass plate has become destroyed.

The commata of Koch present quite other characteristics; their colonies, under exactly the same conditions, developing much more slowly and *never* presenting a brown color. When fresh they have a delicate yellowish red color. They do not cause any such rapid fluid-degeneration of the gelatine in their immediate vicinity; the culture gradually sinks into the substance of the gelatine, forming a sort of funnel-shaped excavation, at the bottom of which may be seen the bacteria as a small dark point. Viewed with the microscope such colonies do not present the sharply-marked, smooth-edged circumferences of the Finkler comma, but rather jagged or indented edges, as if the whole colony consisted of a collection of finely-powdered glass particles; the offensive gases developed by the Finkler are not produced by the Koch commata, even after the elapse of five or six days, although such cultures give off an odor somewhat resembling that of urine. The contrast in the morphology of the growths of these two germs is still greater when observed in puncture cultivations in gelatine in tubes. The accompanying woodcuts show these variations in a very characteristic manner, and have been approved by Dr. Koch.

Even the layman can at once see the energetic development which occurs in the Finkler, in from two to four days, in comparison with the Koch, whereby the former causes very rapid fluid-degeneration of the gelatine, not only on the exposed surface but during the entire length of the puncture in the gelatine; in the one case the Finkler has the form of a pout-leg or "cordon," while in the other it is more like a mushroom. By the Koch comma this degeneration takes place much less rapidly and not in the entire length of the puncture at once, but extends very gradually.



Growth of Koch's Comma Bacillus from Cholera Asiatica.
a 2 days old.
b 4 days old.



Growth of the Bacillus of Cholera Nostrus.
(Finkler and Prior's Comma.)
c 2 days old. *d* 4 days old.

(It is worthy of remark, also, that while the comma of Asiatic cholera has great constancy in the form in which it causes fluidification of the gelatine, that the Finkler often presents the two forms we see in the illustration, and that the one marked the "2d day form" does not change to that given as seen on the "4th day," as one might suppose. On the other hand, the comma of Koch presents the pout-leg or "cordon" form of fluid medium degeneration when cultivated in blood serum; the veiling or cloudiness of the degenerated medium is very much less marked in the case of the Koch than that of the Finkler comma.—Eds.)

These fungi also present equally characteristic biological variations when cultivated upon cooked potatoes. While the Finkler develops luxuriantly upon this medium in ordinary room temperature, forming a colony of a greyish yellow color, encircled by a whitish zone, the Koch comma only grows upon this material at a blood temperature, say 37° C., and forms dark brown colonies similar to those presented by those of glander bacilli.

It must be especially noted that these variations in the biological conditions presented by these two fungi are not by any means accidental, but are, rather, a constant phenomena, as has been sufficiently proven by hundreds of comparative cultivations in the Laboratory of the Imperial Board of Health, as well as by other observers, especially Ermengem of Brussels.

Koch has also proved the same thing in connection with a comma found in the oral cavity by Lewis (*Lancet*, Sept., 1884, p. 513). His bacterium was known long before Lewis discovered it, as shown by Miller of Berlin (*Deutsch. Med. Wochenschrift*, 1884, No. 48), and the morphological similarity is not so close as claimed by Lewis; on the other hand, there are no biological resemblances between this commata and that of Koch; the former does not develop at all in either a neutral or slightly acid gelatine.

So far as the evidence at our command may be at present summed up, it goes to show that the comma of Koch has specific connection only with Asiatic cholera, no one, not even Finkler and Prior, having been able to discover any other form of comma bacteria with precisely the same morpho- and biological characteristics as that of Koch, or which could by any means be taken for the latter when cultivated according to the strict letter of the law as demanded by Koch's methodic process.

The value of this fact cannot be over-estimated when taken in connection with the Etiology and Diagnosis of cholera, or choleroid diseases, as may be at once seen by comparing our illustrations.

It can be most dogmatically asserted that even though the etiological connection between Koch's comma and Asiatic cholera still remains to be proven by direct experiment, still the cultivation of this and morphologically similar bacteria has, thus far, invariably shown the absolute value of Koch's comma as a means to the correct differentiation between two given diseases, and the sure diagnosis of Asiatic cholera.

So much cannot be said in favor of either the assertions or discoveries of any of Koch's opponents. Finkler and Prior (or somebody else) have got to show that the comma discovered by them is even a constant phenomenon in connection with cholera nostrus, or that it has any differential diagnostic value for this last disease.

Summing up, then: My experience during the cholera courses at Berlin has led me to conclude:

1st. That the comma of Koch is a micro-organism peculiar to cholera Asiatica, and that the demonstration of its presence in the discharges, or in the intestinal contents, of a given person, is a sure means to the diagnosis of this disease.

2d. That the biological variations between this comma and others in gelatine cultivations are also so marked as to be of essential, and, at present, of absolute diagnostic value.

ART. X.—THE PHYSIOLOGICAL ACTION OF COCAINE ON THE FROG (*RANA ESCULENTA*), WITH SPECIAL REFERENCE TO ITS LOCAL ACTION ON ORGANS AND TISSUES.

BY H. W. BIGGS, M.D.

(Studies made in the Physiological Laboratory at Berlin.)

In the following experiments the hydro-chlorate of cocaine, prepared by Werck, of Darmstadt, was used. It is non-crystalized, of a dull white color, has a slightly bitter taste, nearly neutral reaction, and is very soluble in water, alcohol, ether and chloroform. The solutions used were all made with water, and were 1, 2 and 4 per cent. in strength.

Local Action.—If the foot of a frog be immersed in a solution of cocaine (2 per cent.) for a few minutes, very marked anæsthesia of the skin is produced, or if a solution (2 or 4 per cent.) is applied to the mucous membrane of the mouth, the same action is observed. When a few drops of a 4 per cent. solution are instilled into the eye of a frog, there is caused after a short time almost complete anæsthesia of the conjunctiva and cornea. The action on the pupil is not constant, but usually a moderate degree of mydriasis is produced.

General Action.—The effects of cocaine given by hypodermic injection begin to manifest themselves very quickly, and in a few minutes have reached their maximum. When large doses are used, the action is seen almost immediately, and the duration and severity of the symptoms are in proportion to the amount administered. After small doses the frogs begin to ercover at the end of a few minutes, but if the quantity given is large, it is many hours, and may be several days, before the effects have entirely disappeared. Lethal doses are from .04 grm. upwards, and when death occurs from the effects of cocaine it is only after the lapse of twenty-four or thirty-six hours.

When a small toxical dose of cocaine (.005 grm.) is injected under the skin of a frog, there are usually at first no perceptible effects. In some cases there is a short period of excitement, but this is not always present, nor is it as a rule very strongly marked when present. The frog soon becomes quiet, he moves less quickly after stimulation is applied, and his respirations are somewhat decreased in number. In a few minutes he becomes perfectly motionless, changes his position only after considerable irritation, and then with an evident effort. Presently his head drops, the respirations become slower, and the pupils somewhat dilated. Twenty or thirty-five minutes after receiving the poison, he lies flat on his abdomen and neck with the hind legs extended, and is unable to raise or balance himself. If strong stimulation is applied he makes a vain effort to spring, which sometimes takes the form of a partial clonic convulsion. There is marked loss of voluntary power over his extremities, and this appears earlier and is much greater in the posterior extremities than in the anterior. The action of the heart is somewhat slower than normal. Not long after this he begins to recover; his respirations are more frequent and deeper, he raises his head, and is able to balance himself when not disturbed. The last function to return is complete voluntary power in his limbs. An hour or an hour and a half after receiving the poison the frog has become quite normal again.

After moderate toxical doses given hypodermically, as after small doses, there is sometimes a short period of excitement, but this even when present soon gives way to the depressing action of the drug. The animal becomes perfectly quiet, the respirations slow and superficial, and the heart's action diminished both in force and frequency. At the end of seven or eight minutes the frog can no longer balance himself, and lies flat on his abdomen and neck with the posterior extremities extended as before. His toes being pinched, he makes two or three powerless efforts to move, and then remains quiet. The loss of power and also sensation is more marked, and appears earlier in the hindlegs than in the forelegs, as in the first experiment. The pupils are dilated. After about twenty minutes he becomes perfectly relaxed, and remains in any position in which he is placed. His respirations are imperceptible, and only weak relax movements occur after severe mechanical stimulation, although a moderately strong interrupted current calls forth muscular contractions.

An hour later the frog lies in the same position. Neither any action of the heart nor any respiratory movement is perceptible, and the reflexes are even less marked than before.

About two hours and a half after receiving the poison, the animal begins to show signs of recovery. It makes some slight voluntary movements, and the reflexes are stronger. Three hours later he turns over on his belly, and irritation calls forth contractions of a clonic character. There are as yet no signs of returning respiration. In twelve or fourteen hours the frog has entirely recovered.

When large toxical doses (.025 grm.) of cocaine are given to the frog hypodermically, the effects begin to manifest themselves almost instantly. All the phenomena observed in the previous experiments here follow each other in rapid succession, and in a much more intense form. There is no period of excitation. In two or three minutes respiration is labored, pupils dilated with opisthotonos, heart's action slow, and reflexes greatly diminished. The frog has a very anxious expression, and in a few minutes drops motionless on the table, extended at full length. Severe irritation calls forth only a very weak response. Respiration ceases with the lungs in inspiration. After many hours, if the dose has not been lethal, signs of returning life begin to show themselves, but it is two or three days before the animal entirely recovers. After the exhibition of a lethal dose the heart continues to act for twenty-four or thirty-six hours, and then stops in diastole.

Action on the Heart.—When a frog has been poisoned by cocaine given by hypodermic injection, the action of the heart is either unaffected or there is a diminution in the rapidity of its pulsations. After very small doses (0.001 grm.) there is no perceptible influence. When a somewhat larger amount is given (0.005 grm.) the frequency of the heart's action is reduced from eight to twelve pulsations a minute, and it becomes irregular and intermittent. In two or three hours the influence of the drug passes off, and the action of the heart becomes perfectly normal again. After very large toxical doses (0.025 grm.) the number of pulsations may be reduced to six or eight per minute. The heart becomes engorged with blood, and its action is very much labored and irregular. The alternate action of the auricles and the ventricles is replaced by an irregular action, and long pauses occur in the pulsations of the ventricles. The ventricles are affected earlier and more severely than the auricles, and when paralysis finally occurs, if it has been a lethal dose, the ventricles cease to pulsate a long time before the auricles.

EXPERIMENT I.

Medulla destroyed.—Heart exposed.—M. iv. Sol. Cocaine, (1 per cent. equals .0025 gramme) injected hypodermically.

Time.	Minutes After Cocaine Given.	Pulsations of Ventricle in 15 Seconds.	Pulsations of Auricles in 15 Seconds.	Amount Cocaine.	Remarks.
11.20		12.12	12.12		
11.24		12.12	12.12	.0025 gr.	
11.26	2	11.11	11.11		
11.30	6	11.11	11.11		Action somewhat labored.
11.40	16	10.11	10.11		
11.45	21	10.11	10.11		
11.55	31	10.11	10.11		

EXPERIMENT II.

Medulla destroyed.—Heart exposed.—M. VIII. Sol. Cocaine, (2 per cent. equals 0.01) injected hypodermically.

TIME.	MINUTES AFTER COCAINE WAS GIVEN.	PULSATIONS OF VENTRICLES IN 15 SECONDS.	PULSATIONS OF AURICLES IN 15 SECONDS.	AMOUNT COCAINE.	REMARKS.
3.43		11.12	11.12		
3.45		12.12	12.12	.01 gr.	
3.47	2	11.11	11.11		
3.57	12	8.8	8.8		Irregular. Occasional long pauses in action.
4.01	16	8.8	8.8		
4.04	19	8.9	8.9		
4.10	25	7.7	7.7		Irregular and intermittent. Occasional pauses of ventricles, while auricles continue to act.
4.15	35	7.7	8.9		
4.30	50	7.8	8.9		
4.36	56	7.8	10.9		
4.52	72	8.9	9.8		
5.	80	9.9	9.9		Acting regularly.

EXPERIMENT III.

Medulla destroyed.—Heart exposed.—M. X. Sol. Cocaine, (4 per cent. equals 0.025 gramme) injected hypodermically.

TIME.	MINUTES AFTER COCAINE WAS GIVEN.	PULSATIONS OF VENTRICLES IN 15 SECONDS.	PULSATIONS OF AURICLES IN 15 SECONDS.	AMOUNT COCAINE.	REMARKS.
4.12		11.12.11	11.12.11		
4.14		11.12	11.12	025 gr.	
4.17	3	4.3.4	8.9		Very irregular and labored in its action.
4.21	7		7.8		
4.24	10	3.3.3	6.6		Heart engorged with blood. Ventricles cannot empty themselves completely. Very irregular and intermittent.
4.27	13	3.2.3	4.5		
4.33	19	3.2	6.6		
4.35	21	3.2.0	6.6		
4.40	26	0.0.0	4.4		Pause of 60 seconds in action of ventricles.
4.50	36	3.2.0	5.5		
5	46	0.0.3	5.6		

Local action on the heart.—If the heart of a frog be exposed, and three or four minims of a 4 per cent. solution of cocaine be injected directly into the ventricle, the heart is immediately paralyzed and stops in systole. If now, as a control experiment, into the heart of another frog the same quantity of water or normal salt solution be injected, no effect is produced save that arising from the physical injury, and this soon passes away; but afterward the injection of the same quantity of a 4 per cent. solution of cocaine causes as before immediate paralysis of the heart in systole.

Again, when three or four minims of a 4 per cent. solution of cocaine are injected into the median abdominal vein, or into one of the great veins of the heart, paralysis either immediately or after two or three beats results. In this case the heart stops in diastole.

The local application by means of a camel's-hair pencil of a weak solution (1 per cent.) of cocaine to the heart muscle, causes a temporary diminution in the frequency of its pulsations.

EXPERIMENT IV.

Medulla destroyed.—Heart exposed.

TIME.	PULSATIONS OF HEART IN ONE MINUTE.	COCAINE APPLIED IN 1 PER CENT. SOL.	REMARKS.
10.25	33		
10.50	34		
11	34	1 per cent. Sol.	
11.4	24		Heart somewhat distended with blood.
11.13	29	1 per cent. Sol.	
11.18	24		
11.34	34	1 per cent. Sol.	
11.36	17		Action labored and irregular, but soon becomes normal in frequency and character.
11.44	30	1 per cent. Sol.	
11.47	17		Irregular. Heart engorged.
12.10	26		

ACTION OF COCAINE IN SUBSTANCE ON THE HEART MUSCLE.

EXPERIMENT V.

Medulla destroyed; Heart exposed; Cocaine in substance applied to both auricles and ventricles. In about three minutes the heart had ceased to beat. The ventricles are in systole and the auricles are in diastole.

EXPERIMENT VI.

Conditions same as in V.

Cocaine in substance applied to heart. After about five minutes the heart had ceased to pulsate. The ventricles are in systole, and the auricles are in diastole.

Four or five hours in neither of these cases had the heart begun to pulsate again.

EXPERIMENT VII.

Conditions same as in previous experiments; results same; ventricles are firmly contracted and pale; auricles large and distended with venous blood. In the last case, eighteen hours later, the heart was found to be pulsating again slowly and feebly. It continued to act for about six hours and then again stopped.

In a number of succeeding experiments it was observed that in most cases, after many hours, the heart commenced again to act, but this was not true in all cases, and when the cocaine was injected directly into the cavity it never occurred. In all cases the ventricles were in systole, and in all but one the auricles were in diastole.

Influence on Respiration.—After small doses of cocaine (.0025 grm.) there is a slight increase in the frequency of the respirations at first, but soon they become much diminished in number, and may be reduced to six or eight per minute. These are very superficial, and sometimes for a short time they entirely disappear.

With medium-sized doses (from .005 grm. to .01 grm.) the temporary rise in the number of respirations per minute is less marked, and the depressing effects of the drug are more quickly seen. The decrease in the frequency is much more rapid than after small doses, and the respiratory movement usually becomes imperceptible in about twenty-five or thirty minutes.

After large toxical doses (from .025 grm., upwards) there is no resemblance of a temporary increase. The respirations rapidly diminish in number and change in character, and usually in ten minutes have become imperceptible. After these large doses respiration stops with a very full inspiration, in other cases apparently after expiration. Respiration does not appear again until the end of at least twenty-four hours, and often it is a much longer time.

EXPERIMENT VIII.

M. IV. Sol. Cocaine, (1 per cent. equals .0025 gramme) injected hypodermically. Frog free under glass jar.

Time.	Minutes After Cocaine was Given.	Respirations. in 15 Seconds	Amount Cocaine.	Remarks.
10.15		18	.0025 gr.	
10.17	2	20		
10.20	5	24		Somewhat irregular, but rather deep.
10.22	7	20		
10.25	10	17		
10.28	13	14		Quick, jerky and superficial.
10.30	15	12		
10.33	18	10		
10.36	21	7		
10.38	23	5		Long.
10.40	25	8		Very superficial.
10.44	29	16		Very superficial, scarcely preceptible.
11.12	57	12		
11.20	1 h. 5 m.	18		Natural.

EXPERIMENT IX.

M. VIII. Sol. Cocaine, (2 per cent. equals .01 gramme) injected hypodermically. Frog free under glass jar.

Time.	Minutes After Cocaine was Given.	Respirations in 15 Seconds.	Amount Cocaine	Remarks.
10.48		18		
10.50		18	.01 gr.	
10.53	3	22		
10.55	5	20		
10.57	7	18		
11.03	13	16		
11.07	17	9		Very superficial.
11.15	25	8		Scarcely preceptible.
11.28	38	None		

EXPERIMENT X.

M. x. Sol. Cocaine, (4 per cent. equals .025 gramme) injected hypodermically. Frog free under glass jar.

Time.	Minutes After Cocaine was Given.	Respirations in 15 Seconds.	Amount Cocaine.	Remarks.
11.33		18		
11.35		18	.025 gr.	
11.37	2	16		Difficult respiration.
11.38	3	14		
11.39	4	12		Very superficial.
11.40	5	None		

Action on Nervous System.—Spinal Cord: when small doses of cocaine have been administered to a frog, the reflexes seem for a short time to be slightly increased. After larger doses the period of heightened reflexes is very short and then follows a period of much longer duration, when they are decidedly diminished. When large toxical doses have been given, there is no period of greater irritability, but almost immediately the general reflexes are very much lessened, and there is soon almost complete loss of all response to mechanical or chemical stimulation. Loss of reflex to strong electrical stimulation never occurs except just before death.

Sensory and Motor Nerves (according to B. von Aurep): "Small doses heighten the irritability of the sensory fibres without having any effect on the motor filiments. Larger doses cause, after a slightly increased irritability of the sensory fibres of short duration, a diminution of the same. Large toxical doses almost completely paralyze the sensory filiment, and diminish greatly the irritability of the motor. Tactile reflexes are much diminished. The pneumogastric nerves are completely paralyzed after doses of moderate size. The small have no perceptible influence on the inhibitory fibres of the pneumogastrics. They either remain after as before the poisoning, responding to the same strength of current, or they are wholly paralyzed."

EXPERIMENT XI. (from B. von Aurep.)

The heart exposed. Both pneumogastric nerves divided.

TIME.	CONTRACTIONS OF VENTRICLES IN 15 SECONDS.	CONTRACTIONS OF AURICLES IN 15 SECONDS.	AMOUNT COCAINE.	REMARKS.
8.30	13.14.14	13.14.14		
8.40	14.14.14	14.14.14		Stimulation right pneumogastric.
	7.4.2	7.4.2		
8.55	13.14.14	13.14.14		Stimulation of left pneumogastric nerve.
	3.3.1	3.3.1		
9.05	14.14.14	14.14.14	0.03 gr.	
9.10	7.6.6	7.6.6		Stimulation of right pneumogastric.
	5.5.5	8.8.8		" " left "
9.20	5.4.5	8.8.8		
10	2.2.2	4.5.4		
11	2.1.2	3.4.3		Very weak heart contractions. The diastoles are of very different duration. The auricles are over-filled with blood.

Local Action on Nerve-trunks.—Cocaine in weak solution (1 per cent.), when applied directly to nerve-trunks, after a very transient period of increased irritability, depresses greatly, and finally paralyzes the nerve. If a strong solution is applied (4 per cent. or more) the action is almost instantaneous, and is preceded by no period of increased irritability. If, however, the solution is not left in contact with the nerve for too long a time, it will regain all of its former irritability in from 1½ to two hours.

A preparation of the sciatic nerve and gastrocnemius muscles of a frog is made in the usual manner. It is arranged (in as fresh a state as possible) on the muscle-telegraph of Prof. Dubois Raymond, and is then connected with the induction coil of his sliding induction apparatus, a simple key intervening. The nerve is placed in a moist chamber, and non-polarized electrodes are used. After determining the irritability of the nerve a solution of cocaine (1 per cent.) is applied by means of a camel's hair pencil. The figures in the second column of the table indicate the distance in centimetres that the induction coil is from the primary, where the contraction of the muscles takes place.

EXPERIMENT XII.

TIME.	CENTIMETRES.	AMOUNT COCAINE.	REMARKS.
10.10	70	1 per cent.	
10.20	43		
10.25	37	1 per cent.	
10.30	33		Contractions very feeble, cannot produce tetanus.
10.35	No response		

(CONTROL)—EXPERIMENT XIII.

Conditions same as in XII. Water used first, then Cocaine.

TIME.	CENTIMETRES	WATER AND SOL. COCAINE.	REMARKS.
10.15	93	Water	
10.20	97*		97 is the limit of the distance possible between the two coils.
10.30	97	Water	
10.40	97		
10.45	97	Cocaine Sol. 1 per cent.	Active Contractions.
11.15	No response		The irritability rapidly diminished after the application of cocaine in solution, and the nerve was completely paralyzed at the end of thirty minutes.

* The irritability of a nerve is often greater soon after removal, than at the time of removal

EXPERIMENT XIV.

Conditions same as XIII.

TIME.	CENTIMETRES.	WATER OR SOL. COCAINE.	REMARKS.
11.10	87	Water	
11.20	97		
11.40	97	Water	Very active.
11.50	46		
12.05	42		After having been in water for one hour and twenty-five minutes, all irritability disappeared in six minutes when sol. cocaine applied.
12.35	36	Cocaine Sol. 1 per cent.	
12.41	No response		

EXPERIMENT XV.

Cocaine in 4 per cent. Solution used.

TIME.	CENTIMETRES.	SOL. COCAINE 4 PER CENT.	REMARKS.
10.50	50		
10.55	50	4 per cent.	
10.56	47		
10.59	No response to the strongest current.		

In a number of other experiments with the action of a 1 per cent. solution of cocaine on nerves, all irritability had disappeared in from fifteen to thirty-five minutes.

EXPERIMENT XV.

Medulla of frog destroyed; sciatic nerve of one leg carefully exposed, as little injury being done to the vessels as possible; the irritability of the nerve is accurately determined with the sliding induction apparatus. A solution of cocaine is now applied until the nerve only responds to the stimulus. A very strong current—normal salt solution (3-4 per cent.)—is then substituted for it, and in the course of an hour and a half the irritability of the nerve has completely, or almost completely, returned.

EXPERIMENT XVI.

Medulla of the frog destroyed. Sciatic nerve exposed, and a cord is passed carefully under it so as to include all of the limb, excepting the nerve, and is firmly tied; frog is poisoned by a moderate dose of cocaine. Then the irritability of the nerve and muscles of the leg not so shut off from the insulation is tested as compared with that of the bound leg, and is found to be much less. If the irritability is again tested after the lapse of an hour and a half (if the amount of the poison given has not been too large), it is found that it has become as great in the poisoned leg as in the other. From these two experiments it is seen that the irritability of a nerve, whether diminished by the local action of the cocaine or by cocaine in the circulation, regains its lost irritability in about the same length of time. It would, therefore, seem as if the action of the drug on the nerve was in both cases merely a local one.

EXPERIMENT XVII.

If the nerve from a nerve-muscle preparation, prepared in the usual manner, be immersed for a few seconds in a solution of cocaine (1 per cent.) and then be removed, its irritability is much increased. The slightest touch of a steel instrument will throw the muscles into violent tetanic contractions. If it be now immersed for a longer time the excitability becomes much diminished and is finally lost to all forms of stimulation. When the nerve is first placed in the solution no irritation is caused by the immersion.

EXPERIMENT XVIII.

If a nerve-muscle preparation be made from a frog poisoned by cocaine, the irritability of the nerve is found to be much diminished (this is also true of the excitability of the muscle). The strength of current required to produce a muscular contraction is much greater than for that from a normal frog. The muscular pulsations are shorter and less powerful, and it is impossible to produce tetanic contractions if the amount of the poison given was at all large. When the interrupted current is passed through it, for some time several short, quick, feeble pulsations occur, and then it responds no more to the irritation. The action is very similar to that produced by stimulation applied to a nerve poisoned by the local application of a solution of cocaine.

Influence on the Power of Co-ordination.—The influence of cocaine on the nervous system would not be complete without an allusion to the apparently marked effects of the drug on the power of co-odination, which all frogs poisoned with cocaine show. This is particularly marked after doses of moderate sizes.

Action on Striated Muscles.—Small doses of cocaine have little effect on the excitability of the striated muscles. But large doses diminish very decidedly their excitability. The character of the muscular contractions called forth by electric stimulation is greatly altered. The pulsations are shorter, slower and more feeble, and the excitability is soon exhausted. The local action of cocaine on muscular tissues is very similar in every way to that found in general poisoning.

EXPERIMENT XIX.

Gastrocnemius of frog (prepared in the usual manner without the nerve) is placed in the Dubois Reymond Muscle Telegraph Apparatus, and is then connected with the induction coil of his sliding Induction Apparatus.

(The numbers in the second column as before, represent the number of centimetres that the induction coil is distant from the primary coil when contraction occurred.)

TIME.	CENTIMETRES.	AMOUNT COCAINE.	REMARKS.
12.03	24		
12.05	23	1 per cent.	
12.07	18		
12.08	17		
12.10	17	1 per cent.	
12.11	16		
12.18	16	1 per cent.	
12.22	15		
12.26	13		Responds feebly and after two or three contractions responds no more.
12.30	12		
12.40	Very feeble response to a very strong current.		

EXPERIMENT XX.

Preparations and conditions same as in XIX. Sol. Cocaine 2 per cent.

TIME.	CENTIMETRES.	AMOUNT COCAINE.	REMARKS.
12.35	26		
12.35	26	2 per cent.	
12.38	20		
12.40	18		Quick short pulsations.
12.44		2 per cent	" " "
12.50	16	2 per cent.	
12.55	15		Contractions slow and feeble.
1.07	12		Responds very feebly.
1.15	5		
1.25	No response		

(Cocaine applied by means of a camel's hair pencil.)

The application of cocaine in substance to a muscle causes a gradual diminution in the excitability, until finally, after from twenty to twenty-five minutes, there is no response to the strongest interrupted current. It requires many hours for a muscle to regain its excitability when it is to any considerable extent destroyed by the local action of cocaine.

The action of cocaine on the frog may thus be summed up as follows:

1. It has a powerful local anæsthetic action on the skin, mucous membrane and eye. It usually produces mydriasis.

2. It has a depressant action on the heart, reduces first the force and frequency of its pulsations, and finally paralyzes it (first the ventricles and then the auricles) in diastole.

3. In small doses it at first slightly increases the number of the respirations, then decreases them; and in large doses diminishes the number from the first, and finally causes death from paralysis of respiration.

4. It at first slightly heightens and then depresses the reflex action of the spinal cord.

5. In small doses, it at first slightly increases the irritability of the sensory nerves, then depresses their irritability, and in large doses, depresses from the first.

6. It has a depressant action on the motor nerves in both large and small doses (not very small).

7. It paralyzes the pneumogastrics.

8. The moderate-sized doses diminishes the excitability of the striated muscular fibre.

9. From a comparison of the local and constitutional action on the different organs and tissues, it is rendered probable, at least, that its constitutional action is wholly a local one, exercised alike on all parts, for which it has a chemical affinity, through its presence in the blood.

The writer hopes, not far in the future, to be able to report in the same manner the local and general action of cocaine on the organs and tissues of the warm-blooded animals.

ART. XI.—TUBERCULOSIS IN THE UDDER OF THE MILCH COW, AND ITS EFFECTS UPON THE MILK.*

BY DR. B. BANG,
[Teacher at the Royal Veterinary School and Agricultural Academy,
Copenhagen.

My purpose in calling the attention of this honorable body to Tuberculosis in the Udder of the Milch Cow is with the hope of contributing somewhat to the knowledge of the Medical Profession with reference to the important relation existing between tuberculosis in the domestic animals and man. It has been acknowledged by all sides, that the danger of the transmission of this disease to man from animals, lies chiefly in the consumption of the milk from diseased cows, it being one of the chief articles of food among human beings, and especially because it is largely used in an uncooked condition. Although we must, *a priori*, assume that all milk derived from a cow complicated with tuberculosis, carries with it an infectious character, this is still greater when the organ of its production, the udder, is the seat of tuberculosis processes. Virchow, Bollinger, Galtier, Johne, Koch and others have all emphasized this idea. Galtier even asserts that the milk only has virulent properties when the udder is affected. Koch endorses this opinion. In his work upon the etiology of tuberculosis he says: "It is above all things necessary to infection, that the milk is infected with tubercle bacilli. This does not appear to be the case save when the milk glands are also the seat of the processes of tuberculosis." Further he says: "As the nodes of 'Perlsucht,' are but seldom met with in the udder, it is probable that the milk of such cows will be found frequently free from infectious properties. This fact explains the contradictory conclusions of different authors who have busied themselves in experimenting with the milk from such cows. Some report to have received positive results from such experiments, and their assertions are of such a nature that we cannot doubt the correctness of their observa-

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tions. Others, however, have only observed negative results as the conclusion of such experiments. Both parties have probably been correct. Positive results would only, then, follow in cases wherein the milk contained tubercle bacilli; negative with such as was free from them."

From these quotations it is evident that Koch is not inclined to look upon the consumption of the milk from cows afflicted with tuberculosis as of very great practical importance, as he does not consider that the tuberculosis of animals plays as important a role in the etiology of tuberculosis in man, as many other authors have done.

It will be my task to emphasize the importance of such milk as a source of infection. I hope to do so by proving the frequency of tuberculosis in the udder, as well as the highly virulent properties of the milk secreted by such udders.

It is well known that the processes of tuberculosis complicate the udder as well as the other organs, although we cannot say that veterinarians have given the attention to this particular part of the question which its importance deserves. As far as I know, its occurrence in the udder is most frequently mentioned in German literature.

Franck (Gubürtshülfe) describes the disease as follows: "The udder is frequently invaded by numerous tubercles of variable dimensions. The disease does not generally extend to the udder with, or shortly after parturition, but more frequently much later. The milk secretion diminishes, the milk itself becomes watery and viscid, then follows hypertrophy and induration of the affected part of the udder, or the whole organ, these conditions sometimes becoming very prominent, the organ weighing forty to fifty pounds; sometimes we can feel the nodes by palpitation. The hypertrophy constantly increases, while the milk secretion as constantly decreases to absolute cessation. The udder frequently becomes almost as hard as a stone. General phenomena, aside from those common to tuberculosis, fail. On slaughtering the animal, one finds the udder to be sclerotic and infected by tubercles in various stages of development. The lymph glands in the vicinity of the udder also become complicated, as a rule. Small abscesses are frequently formed. Treatment is useless." Ackerman, Fünfstuck, Meyer, Dinter, Hartenstein, Brauer, and others have also reported cases of udder tuberculosis. In 1868 Fárstenberg—"Die Milchdrusen der Kuh"—considered the disease under the name of "Sarcomatosis." He did not look upon it as of very frequent occurrence. Pflug mentioned having observed it in 1877. Galtier and Walley mention its occurrence in France and England respectively.

It is thus evident that this peculiar complication of the udder in the milch cow is by no means unknown. Pathologists have considered it as of a most important occurrence. Notwithstanding these facts, the disease has never been subjected to intimate analysis or thorough study.

It has been my fortune to observe an uncommonly large number of cases during the last few years. In 1881 I saw two very marked cases in the cattle hospital of our school. In answer to my inquiries, veterinarians have sent me three tuberculous udders, as well as a cow afflicted with the disease in this organ. During the next year I had no occasion to observe the disease, but during the last winter the cases accumulated so rapidly that in the course of seven months, seven different cows were found thus diseased in seven different dairies in the city or its vicinity. A renewed appeal to the veterinarians was rewarded by fourteen new cases. Six of the same were discovered at the Copenhagen Cattle Mart. I was enabled to make an intra-vital as well as post-mortal examination of most of them.

An intra-vital diagnosis of this complication can be generally made without difficulty, and very early in the disease.

In brief, this complication is not characterized by any perceptible general disturbances. It frequently presents itself as a very diffuse, painless, intumescence of one—seldom two—quarters of the udder, most frequently one of the posterior ones. The tumefaction is generally considerable when the veterinarian's attention is first called to it. This is chiefly ascribable to the little importance which the dairyman frequently gives to such occurrences. From personal observation, I have, however, come to the conviction that no inconsiderable degree of tumefaction can occur in a very few days.

It is worthy of especial attention that such a markedly tumefied udder can at first yield an apparently healthy milk. This fact is of essential value in the differential diagnosis between this complication of the udder and those of a purely inflammatory character, whereby the milk secretion is always changed in its character, frequently to a very high degree.

In cases of violent mastitis a very acute tumefaction of the organ takes place in a few hours, accompanied by fever; in such cases either no milk at all is secreted, or only a thin, serous, sometimes offensive smelling fluid. In milder forms of inflammation the secretion may present a more milk-like appearance, but it is always thin, watery, and contains whitish, floculent, or caseous masses of variable dimensions.

Only when the inflammation has essentially subsided can an apparently normal milk be again secreted, though the intumescence may not have entirely disappeared. In violent mastitis the secretion becomes gradually purulent in character, abscesses being a frequent occurrence in the substance of the gland.

In cases where I meet with a very recent, diffuse, painless, and tolerably firm intumescence of the udder, or a portion of the same, and from the teat am enabled to press out a good appearing milk, I consider that I am warranted in diagnosing the trouble as Tuberculosis. In only one case have I erred in my diagnosis. In this one I found a moderate tumefaction of a quarter of the udder, of twelve days' duration—swollen condition of neighboring glands—milk but little changed, somewhat more watery than normal. In the course of three months the condition of the milk had shown no further change, but the complicated portion of the udder had gradually become smaller than the other quarters. The cow remained well. In all other cases the complicated quarter of the udder had gradually increased in size and density, until finally it became almost as hard as a stone and of an immense size, while the non-complicated parts as gradually atrophied. During the course of the disease the neighboring parts were frequently the seat of extensive œdematous tumefaction, which gradually diminished, and, according to my experience, never began with the severity which generally accompanies severe inflammatory processes in the udder. The secretion of the lacteal glands generally retained its milky appearance for months, becoming gradually more watery in character, to become finally somewhat flocculent and serous, but the secretion continued. If one first meets the disease in this stadium it can be easily mistaken for mammitis. If, however, we take into consideration the *very important intumescence of the udder*, as well as its unnatural hardness, *and the complete failure of suppuration*, a mistaken diagnosis is not easily made. The diagnosis of tuberculosis is essentially supported by the tumefaction of the adjoining lymph glands, which often become very much enlarged. When the anterior quarters are alone complicated these glands are not found to be swollen. In all such cases one should be very careful in obtaining the anamnesis, *i. e.*, the history of the case. If one finds that the tumefaction has gradually developed, and that the secretion appears comparatively normal, there is no doubt with regard to the diagnosis.

These conditions do not seem to have received the attention which their importance demands. That the diseased portions of the udder secretes an apparently good looking milk during the first stages of the complication is of manifest diagnostic importance. It is self-evident that such milk will be used for human consumption so long as it appears to be normal in character. I could quote sufficient proof that such is the case. It shows the necessity of the most exact control of the milch cows by competent veterinary inspectors; for such milk is frequently mixed with other, which thereby contaminates and makes the whole product of the dairy dangerous to the consumers.

As to the infectiousness of milk secreted by such portions of the udder of the cow as are the seat of tuberculous processes, I must say that I have always been able to demonstrate the presence of a great number of the bacilli of tuberculosis. It is not always so easy, however, to find the bacilli; when present in small numbers one may have to examine many preparations before finding them. In other cases they are easily to be found.*

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* We have never had opportunity to examine such milk, but judging from the analogy, and from the examination of human sputum, I should say that they would be found in the flocculent material, which is to be demonstrated by spreading the same thinly on a covering glass and allowing it to dry, and then coloring it with fuchsin or gentian violet by methods which will be described in the Journal, as they have already been in last year's editions.—EDITORS.

In one case I was enabled to discover over two hundred bacilli in one covering glass specimen of such milk, although the milk appeared comparatively normal one month after the intumescence of the gland had appeared. In the beginning they are not generally so well represented, but when we find several on each covering glass it is safe to assume that in drinking a glass of such milk a person would introduce into his system millions of these disease-producing germs. I must here remark that the bacilli generally contain spores, which greatly increases their virulent qualities. Koch has asserted that, like those of anthrax, only the bacilli which contain spores are capable of causing infection and withstand the action of the juices of the stomach.

When the milk from such a portion of the udder is found in this condition there is every hygienic reason for condemning the whole yield of the cow, for I have always found the milk to possess highly virulent characteristics also.

My attention was called to this important point very early in my studies of the subject. I found that the disease extended to the other portions of the udder very early in the malady, so that it is probable that the milk drawn from the anterior cisterns, notwithstanding its normal appearance, is already afflicted with virulent qualities. I also found in such cases that small miliary nodes had already made their appearance in the walls of the milk cisterns. As early as 1882 I was enabled to produce infection in rabbits by the subcutaneous injection of small quantities of such milk. The animals first demonstrated the phenomena of disease in the course of two months, and died in from 2½ to 3½ months of tuberculosis. I have since repeated these experiments with the most successful results. I used the milk from the diseased as well as the apparently healthy parts of the udder; in each case tuberculosis was the positive result. In each case I subjected two rabbits to the experiment, injecting about four grammes of the milk into the abdominal cavity. Numerous other experiments of a similar nature were followed by like positive results in the course of from two to three months. As to the virulence of the milk from the apparently healthy portions of the udder, it is well to remark that my experiments have been confirmed by those of May.

These experiments should sufficiently demonstrate the fact, that the milk from the apparently non-complicated portions of the udder contains equally virulent elements with the parts which ocular and palpitatory examinations demonstrates to be the seat of tuberculous processes.

It is evident that all dairies should be subjected to veterinary inspection, and that all cows in which tuberculous processes are diagnosed in the udder should be at once slaughtered.

I must here especially call attention to the fact that I have frequently found unquestionable cases of tuberculous mammitis in cows that were otherwise apparently healthy, which leads me to assume that tuberculosis can occur in the udder of the cow as a primary complication. I have, however, found that in such cases the bronchial or other glands were frequently the seat of old caseous or calcified processes which, in all probability, had connection with processes in the lacteal glands. Whether there are other means of infection by which the bacilli can gain direct access to the milk glands is still an open question.

Notwithstanding the assertions of Koch, it is certain that cows frequently eject a form of sputum from the mouth, and as the intestinal canal is also the seat of tuberculous ulceration, it is also probable that tubercle bacilli are passed off with the fæces. The uterus mucosa has also been found to be the seat of extensive tuberculosis, and I have myself found tubercle bacilli in the vaginal discharges from such cows. Tuberculous abscesses also occur in the retro-pharyngeal regions, and I have found bacilli in their contents. That consumptive attendants may be the cause of the infection of cows and other animals is not without most positive evidence.

It is certainly of theoretical, as well as practical interest, to know if the udder can be directly infected by tuberculous elements from without, *i. e.*, through the canals in the teats. That the disease can and does occur as a primary complication of the udder and that general tuberculosis may then result, has been proved beyond all question by my observations.

In those cases where tuberculosis of the udder followed as a secondary complication, I have found that pulmonary complications were generally anticipatory; in other cases, tuberculosis of the uterus or fallopian tubes.

The pathological anatomy of tuberculosis of the last named organs deserves some consideration on our part. In the writings of authors we generally find it mentioned that one meets nodes in the uterus, and that tubercle in the udder, of varying dimensions, have also been seen. According to my ideas this description is very unsatisfactory. I have always found the affection to be very recent and diffuse, so that the complicated portions of the udder was the seat of extended intumescence. In saying this I do not mean to assert that all the swollen part possessed the same degree of hardness, but these tumefactions were not so sharply circumscribed as to warrant my designating them as nodular in character. In cases, where the course of the disease was of a very chronic character, the tumefactions were more sharply circumscribed. In others I have found neoplasmata of the size of a walnut or hen's egg in parts of the uterus which were not otherwise complicated.

If we make a section of that portion of the udder which is the seat of tuberculosis processes, we obtain a somewhat different picture, according to the duration of the disturbance. In all cases we find a firm intumescence of the complicated parts, the entire cut surface having a singularly homogeneous appearance. The tumefied portions are distinguished from the healthy by a sharply marked line of demarcation. In the earlier stages of the disease, *i. e.*, the first few weeks, one finds the lobuli of the glands swollen, moist, and of a homogeneous grayish color. By more exact inspections we are enabled to see somewhat harder yellowish objects in the substance which evidently correspond to the acini of the gland, and besides these branching yellowish striæ which corresponded to the smallest lacteal ducts. The larger ducts are filled with a yellowish caseous mass, or their walls are coated with the same. This caseous mass will be found to be rich in bacilli. Nodulation in the walls of the larger ducts and milk-cisterns can also be seen.

The tissues that are most intensely swollen have a variegated reddish color that is due to circumscribed extravasations of blood. The veins of the udder are the seat of extensive thrombosis. The tuberculous nature of the disease is not always distinctly marked by the microscopic examination of such fresh cases. One could easily mistake such conditions for the result of a simple chronic inflammation. The true nature of the complication would, however, manifest itself to the competent observer by the caseous affection of the smaller lacteal ducts as well as the tumefied condition of the neighboring lymph glands, which are generally the seat of exquisite tuberculous infiltration.

The phenomena rapidly changes, however, with the progress of the disease. The caseous degeneration of the lobuli of the glands extends rapidly, forming dry, yellowish nodes of an irregular form, which in some places occupy only a portion of the lobulus, while in others they complicate the whole of this portion of the gland. Sometimes several of the lobuli coalesce to a caseous mass. Sometimes the lacteal ducts are found to be distended—ectosis—and filled with a caseous secretion. Interstitial processes are to be seen in and around the lobuli, as well as the complicated lacteal gland. Sometimes the interstitial processes predominate, single neoplasms being only seen here and there in the indented substance of the gland. In very few cases I have met with a soft or fluid contents in the lobuli.

Tubercle bacilli were to be found in the caseous products, as well as in the accumulations of round cells, and in the neoplastic connective tissues.

In my description of the symptoms of udder tuberculosis I have mentioned some experimental proofs of the same, with reference to the milk.

Inoculation experiments can only prove that the milk used contained virulent, *i. e.*, infectious elements. Feeding experiments can only show whether the tuberculosis of the udder is capable of being transmitted from the cow to other animals, consequently to human beings. Such experiments have been frequently made, with many contradictory results. According to the results collected by Johne of ninety-one such experiments made with the milk from tuberculous cows, 30 per cent. gave positive, and 59 per cent. negative results.

I have already mentioned that many observers have tried to explain this variation in the results, by the assumption that the udder could only have been complicated in the cases followed by positive results. I cannot agree with this assumption, as tuberculosis of the udder is such a well-marked complication that it appears improbable that its diagnosis could escape the attention of any competent observer. I shall endeavor to justify this remark later on. The question is of such vital interest that the repetition of feeding experiments with the milk from cows that were unquestionably afflicted with udder tuberculosis is warranted.

I have, therefore, fed five young pigs and three rabbits with the milk from two different cows. Both experiments had to come to an earlier termination than I desired; on account of the cessation of the milk secretion and death of the cow. The animals were, however, fed almost exclusively with said milk for two weeks, and later the milk obtained was mixed with the food.

From the first cow I only used the apparently normal milk from the seemingly healthy quarters of the udder; from the second cow I used the secretion from all parts of the udder.

Two pigs and one rabbit were fed with the milk from the first cow. The pigs received the milk from the 1st of January until the 3d of February, 1884. They were killed on the 1st of August, and in both the mesentery glands were the seat of caseous degeneration, as well as those in other parts of the body. Caseous ulceration in the vicinity of the valvula Bouhini in both; tubercle in the lungs, liver and spleen of each animal.

The rabbit was killed on the 29th of July. It had not shown any symptoms of importance. It was tolerably fat, but well-developed tuberculosis was found; ulceration in the intestines, as in the swine; also tubercles in the intestinal cavities, calcified nodes in the mesenteric glands, and isolated tubercles in the kidneys and lungs.

As was to be expected, the tubercular processes were much more manifest in the animals fed with the milk from the second cow. Two rabbits and three pigs were used in this case. The period of experimental feeding extended from the 8th of May to the 14th of June. The animals were killed on the 8th of August. The rabbits had not thrived well during the last part of the time; in both there was extensive tuberculosis of the intestinal parieties; extensive ulceration in the apex of the cœcum, and numerous caseous follicular ulceration dispersed through the intestines, as well as extensive ulceration in the vicinity of the valvula Bouhini; caseous degeneration of the lymph glands and tuberculous infiltration in the liver. Lungs, spleen and kidneys apparently healthy.

The pigs were apparently healthy intra vitam. In all of them, however, caseous nodes were to be seen in the lymph glands of various parts of the body. In two, caseous follicular ulceration in the vicinity of the valvula Bouhini, and in one of these pigs, and the third, tuberculosis pulmonum.

In the caseous nodes of the mesentery glands as well as in the caseous pus of the follicles in the intestines, I found tubercle bacilli, but never in great numbers.

The importance of these experiments from the hygienic point of view as well as the economical to the consumer in the first place, and the breeder of animals in the other, cannot be overestimated.

Dr. L. Anderson of Seeland, reported to me a case of the transmission of tuberculosis to a calf from a cow having udder tuberculosis by means of natural feeding. The lady of the house who had been previously considered healthy, though perhaps complicated somewhat with hereditary tendencies, commenced to cough at the same time and ended with a rapidly developing phthisis. During the early stage of her disease she gave birth to a child which was fed with the milk from one cow, also tuberculous, and which died from the disease within a year. Within six months the child also died of tuberculosis. Although the connections are somewhat complicated, it is very probable that the child derived its disease from the cow's milk.

As to the question whether the milk contains infectious elements if the udder is tuberculous or not, there is some difference of opinion among authors. May's experiments seem to prove that it is. I have made experiments with the milk from two cows that had very marked tuberculosis, but not of the udder. The inoculation by one rabbit gave a negative result, while by the other they were of a most decided positive nature. I must therefore differ from Koch in concluding that tuberculosis can be generated from the milch cows having the disease, even when no complications can be found in the udder. In one such case I have been able to find bacilli in the milk, though I could find no evidence of disease in the udder. I must mention some experiments made with milk that had been treated by the centrifugual method, which is used to separate the cream. One advantage of this method is that the milk is thereby freed from dirt and foreign elements, which accumulate on the sides of the machine. An interesting question, therefore, arose in my mind—if the tubercle bacilli were also thus separated from the milk? Four rabbits were each inoculated, two with the clear milk, and two with the sediment. At the same time I made covering glass preparations from both materials. But very few bacilli could be found in the milk itself, while large numbers were to be seen in the sediment. They seemed to be mostly in the body of the lymph-cells. In one cell from the sediment I could count twenty bacilli. This examination demonstrated that the centrifugal treatment of milk from cows with udder tuberculosis is insufficient to separatethe bacilli securely from the fluid, though large numbers are undoubtedly precipitated on the sides of the machine.

The result of the inoculations was as follows:

In the first series, one of the rabbits treated with sediment material was soon attacked with septic phlegmonia-cellulitis, and died in twenty-three days. No microscopic appearance of tuberculosis. The other rabbit died fourteen days later from a most acute miliary tuberculosis, which was accompanied by inflammatory exudation in the abdominal cavity. In the other series, the animals in which sediment was inoculated, both died of miliary tuberculosis.

Of the four rabbits in which the skimmed milk was inoculated, one from each series was killed on the 9th of August. Both were infected with tubercles, but were not so emaciated as those that had received sediment material.

The third rabbit, which was inoculated with the milk on the 17th of June, died of general tuberculosis the 29th of August; the fourth on the 5th of September. The tuberculous neoplasmata in the organs of these animals had obtained considerable size. The centrifugal treatment is not sufficient to rob the milk from cows with tuberculosis of the udder of its virulent qualities.

EXPERIMENTS WITH REFERENCE TO THE INFLUENCE OF HEAT UPON MILK CONTAINING TUBERCULOSIS BACILLI.

May and others have shown that, when such milk is cooked to the boiling point, it loses its virulence, *i. e.*, the bacilli are killed. We decided upon a temperature of 72°, because experiment has shown that when it is heated to 60°–70° C., the milk retains its good qualities as well as when cooked, without changing its taste, and it might be expected that milk dealers would soon ascertain this fact. We then took the sediment from the centifugal machine, which was rich in bacilli, and warmed it for a quarter of an hour in a warm bath heated up to 72° C. One gramme of this material was subcutaneously injected into two rabbits. Both were killed at the expiration of eight weeks, and, aside from some small gangrenous nodes in the liver, were healthy.

Herr v. Storch, superintendent of our chemical laboratorium, subjected the milk from a cow with udder tuberculosis to chemical analysis, with the following results:

"When we compare the two analyses of the milk taken from the diseased gland with one another, we find that the percentage of fat and milk-sugar had materially diminished between the 7th of May and 6th of June; it is striking that the milk-sugar should have almost entirely disappeared. The milk from the apparently healthy, non-tumefied portions of the udder was rich in fat and albuminoids; in its other chemical constituents it varied but little from normal cow's milk.

"The appearance of the serum of the milk from the diseased portion of the gland caused me to analyze the ascher from this milk, and that from the apparently healthy portions of the udder. The same demonstrated striking variations on the part of the milk from the diseased quarter. The proportion of lime and phosphate was much less, with the soda salts greatly augmented. The soda salts were also much more profusely represented in the milk from the healthy portion of the udder than in normal milk; the other salts were about normal in quantity.

"I was singularly struck with the almost total absence of chlorides in the milk from both portions of the udder of this cow; but as I have met with this condition in normal milk it probably had nothing to do with the disease."

ART. XII.—AZOTURIA.*

BY THOMAS W. ROGERS, V.S.

I purpose to-day to call your attention to Azoturia, the hæmoglobinuria of the Germans. The first notice of this condition in English speaking literature is found in Haycock's contributions to veterinary pathology, article Hysteria.

Haycock observed the disease only in mares, and was led to the conclusion that it was an abnormality of the sexual function somewhat analogous to nymphomania. Subsequent writers have shown that it is almost as frequent in horses as mares.

Symptoms.—These follow usually in a well-worn groove. The horse, after a number of days confinement, during which time he has received his usual allowance of highly nutritious food, is taken out to drive; he goes right up to the bit—indeed the driver often remarks that he could hardly hold him—then often without premonition he falls in the shafts, unable to rise with or without assistance. The animal, retaining all his powers of mind, exhausts himself in fruitless struggles to rise, breaks out into a profuse perspiration, and if urine is discharged during this time it is usually dark in color—coagulating rapidly on cooling. Sometimes this condition persists until death; at others the symptoms ameliorate almost as rapidly as they showed themselves. There is swelling of the glutei, hard and board-like in character. The horse is usually well on the road to recovery or dead in forty-eight hours. The temperature is elevated.

Differential Diagnosis.—The conditions liable to be confounded with azoturia are—apoplexy, simple paralysis due to nervous lesion, spinal and cerebro-spinal meningitis. From apoplexy it may be distinguished by the retention of the sensory functions, the absence of oral breathing and the character of the urine. From simple paralysis, by the fact that in azoturia neither sensation nor motion are totally in abeyance, and again by the characteristic urine. In paralysis caused by obstruction of the iliacs, examination of the aorta post and its quadrifurcation will establish the diagnosis, and abnormal coldness of one or both hind limbs will lead the practitioner to make such examination.

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* Read before the New Jersey Veterinary Medical Association, Dec. 10, 1884.

From cerebro-spinal meningitis it may be differentiated by the difference in temperature—in cerebro-spinal meningitis below normal or normal, in azoturia always elevated; the swelling of the quarter is absent in cerebro-spinal meningitis; and there is usually difficulty in deglutition, and often alterations in the higher sensory functions. The urine may be dark, but is usually of a redder tinge than in azoturia; microscopically the diagnosis is patent. We find bloody urine in cerebro-spinal meningitis, urine dark from the presence of free hæmoglobin or its derivatives in azoturia. In spinal meningitis—a rare condition—I have only seen four cases in a practice of five years—the symptoms are not usually fulminant. If the animal is in harness there are short periods of great lameness, amounting to mobility of progression, followed by the animal falling; there is a straddling, squatting gait, the symptoms much aggravated by rectal examination (this also in azoturia); the horse often gets up and down, has clonic spasms of the muscles of the entire body; these are very characteristic, as are also the intervals of ease; there is straddling and paddling of the hind legs as in kidney troubles, no hardness of the quarters, and usually little discoloration of the urine. The struggles when down are not at all confined to efforts to rise, as in the early stage of azoturia, but are made without reason, though not without rhyme, as they are usually rhythmical in character. Later on in azoturia we have, however, similar convulsive efforts.

From blind staggers it may be diagnosed by the difference in situation; blind staggers, probably anthracoid in character, is only seen in animals pastured on low, rich-bottomed meadows in summer time, azoturia is usually a disease of winter and of the stabled animal.

Causation.—Azoturia is a disease of the functions of nutrition—a disease of nutritive excess. It is a disease of the well-to-do man's horse.

One of the conditions of health is that the excess of nutrition be removed by the lymphatics; it is conveyed again to the right side of the heart along the thoracic duct, and again poured into the current of the circulation to nourish the tissues. In azoturia there is so great nutritive excess that a large portion of nutritive matter is thrown back, undergoes retrogade decomposition into urea, or the analogues of urea, and acts as a poisonous substance on the nerve centres. Centrally it is probably a failure of the liver to perform its scavenger-like function of burning up the waste proteids.

What I wish especially to call your attention to, however, is that whatever its exciting cause, *azoturia is uræmia.* You have to deal with uræmic poisoning, and whether this is caused, as in this case, by the impaction of a surplus of nutrition in a healthy, hard-working organism, or is due to inability of the kidneys to separate retrograde material from the blood, matters little as regards your treatment. The question may be asked, why is azoturia more common in mares than in horses? I think the question admits of ready answer. The female organism is, so to speak, more conservative than the male, intended by nature to care for and support her parasitic offspring. She lays up with greater readiness than does the male a supply of nutritive matter in excess of her own requirements. I think this part of my explanation is strengthened by the fact that mares in foal rarely have azoturia. Secondly, the function of reflex irritation is higher in mares than in horses. Dr. Zuill, of Philadelphia, informs me that he has found as high as 22 per cent. of urea in the urine of azoturia.

Post Mortem appearances.—Congestions of the meninges. The blood often chocolate-colored or somewhat tarry, but not abnormally fluid as in the tarry blood of anthrax, or deficient in red disks, as in the leucocythemia. The color is probably due to the admixture of the effete lymph. The liver is usually yellowish, enlarged, friable; the kidneys enlarged and congested, sometimes containing pus in their pelves, and the true mucous membrane of the bladder inflamed. The condition of the bladder is due to ammoniacal decomposition of the urine in a similar way to that found in old men with enlarged prostate, the constant action and reaction of the mucous thrown out by the irritated viscus on the urine, and the irritation of the urine assuring the secretion of the mucous.

I call your attention to a sequel of azoturia unmentioned, as far as I know, in English works. It is an almost complete atrophy of the crural triceps of the muscle of the fascia lata, and in some cases of the glutei of one side. The first case I saw was in Philadelphia. I was called to "*put in the stiflc*" of a horse. I found the patella in its place, but imagined that I had a dislocation of the femero-tibial articulation. I was satisfied that I could place my hand on the tibial spine, and to show you that this great error of diagnosis was not due to any carelessness, two thoroughly qualified Philadelphia veterinarians agreed with me, and also agreed that attempts at reduction would be futile, as if, by extension and counter-extension on the limb while the horse was recumbent, the dislocation could be reduced, the condition would recur on rising. A big blister was placed on the affected side and the horse left to his fate. Imagine my surprise when I saw the horse last summer as sound as a dollar, without a trace of the old trouble.

Since then I have been consulted on several similar cases; have advised as treatment repeated blisters and the battery, with a long run at grass. This has been successful in each case, but has required many months to bring about the result. The appearance is peculiar; there is apparently a big hole in the affected flank, and the femur is almost denuded of musculature arteriorly.

Dr. Huidekoper suggested to me that rupture of the psoæ was partly the cause. This may be so in some cases, though none of mine had sufficiently marked abduction of the limb to warrant the diagnosis. The cause may be a tissue change of pyrexia, local embolism interfering with nutrition, or altered nervous action, due to pressure. One of my cases was complicated with a most distressing vesica vaginal catarrh.

Treatment.—Starting from the standpoint that we are dealing with uræmia, the endeavor of the intelligent practitioner will be addressed to ridding the system as quickly as possible of the poisonous matter. I well remember, when a student, seeing these cases brought in usually to be carried out again heels up. The routine treatment is to purge and bleed. The first part of the treatment I will pass over with the remark that if the patient would be accommodating enough to live until the purgative acted, it would be very good treatment indeed. Usually he dies before the purge acts. If he lives eighteen to twenty-four hours, and goes on to recovery, there is the open question as to whether the purge or the *vis medicatrix naturæ* is to be thanked for it. Bleeding is, I think, to be recommended; it offers a means by which we are enabled to rapidly remove a large amount of urea from the body, and also tends to lessen the action of the remaining poison on the nerve centres. To bleed and purge, however, is to knock down with one hand and set up with the other, as nature, ever tenacious of her balance, will rapidly withdraw from the body fluids enough to make up the mass of blood, and thus hinder the action of a purge, depending, as it does, for its action, in a great degree on the maxim, "ubi irritatio ibi affluxus." When I tell you that I rely almost exclusively on morphia, and that my practice has been so successful that last winter about nine cases, most of them bad ones, made good recoveries, it may provoke a smile from those of you who are intensely practical.

Let us see. What does morphia do for us? In the first place it puts a stop to the action of the urea on the nerve centres, it quiets the irritable patient, it allows him to stand quietly in slings and so avoid knocking the bark off himself in futile struggles. You may be still more incredulous when I tell you that my principal reason for the use of this remedy is to get its eliminative action—and you wont get this from the use of ten or twenty grains. You are of course aware that the narcotics may be pushed much further in the lower animals than in man; their action is directed more to the cord and less to the higher faculties than in man, and to get good results from the morphia treatment of azoturia you must push it far enough to get its toxic action. You must give ten or fifteen grains every hour or so until the patient rests quietly and sweats profusely. You may push it so far that it induces automatic, convulsive movements of the limbs, simulating trotting or galloping, and you will do no harm by this course. To reassure you, I may state that the same treatment is frequently adopted in the uræmia of mankind with equally good results. I have given a drachm in twelve hours without producing sleep and with excellent results. Do not be afraid of it, use it freely and it will do you good service.

With regard to other treatment, I advise you to get the horse into slings as early as possible; if he entirely loses the control of his hind limbs it will, of course, be necessary to lower him, and I may add that a smart stroke of the whip will often make him stand when hanging in them.

The local complication, the "kidney trouble," attracts usually most attention from the laity and the ignorant horse doctor.

Gentlemen, let me most strongly impress upon you the fact that it is not a kidney affection. The kidneys are doing their work—are working up to the very limit of their power. Do not aggravate them by the use of diuretics, especially of those resinous in character. If you must use them, then, and when on the road to recovery, use squills and digitalis. If there is retention, shown by examination of the bladder, you may pass the catheter. And here again a word. Do not do it until your horse is comfortably in slings and has had a dose or two of morphia, as I have on several occasions seen the irritation caused by the passage of the catheter cause convulsions and the getting down of the animal. Of course if you find your patient recumbent with a full bladder it is well, especially in the horse, to put on the hind hobbles and take away the water, though personally I prefer to pass the catheter standing.

A hint about catheter. You will find the thick foreign instrument, with bluntish point, much less liable to lose its way than the thin American one, fit only to pass on the stretched urethra of a bull.

Have you vaginitis or cystitis following? Treat them on general principles: rest the bladder by the use of purgatives, sheath it by the administration of mucilaginous drinks, soothe it by warm rectal injections, and you may, do you deem it necessary, supplement these means by washing out the bladder through the catheter. What food? No food for forty-eight hours; then food poor in nitrogen. Preventive measures, thorough ventilation, good drainage, good grooming, regular exercise,—even if the hired man has to be sent out sleighing,—and a diminished ration if the quietude is imperative. You will find the question as to the use of nerve stimulants and blisters discussed in the scanty and disgraceful veterinary literature of this subject.

Their use could only arise from a mistaken notion regarding the pathology of the condition, and I would take this opportunity of saying that if you would aid in the advance (now so great) of veterinary science in this country, you must go to comparative medical literature for aid. You are not competent to treat diseases of the lower animals unless you are able to thoroughly understand and appreciate human pathology. Confine yourselves to the scanty pabulum offered you by veterinary literature, and you will be routine practitioners at best, groping in the dark, not after science but dollars, and although the ability you may discover in finding these last may be a surprise to your neighbors and yourselves, you will never benefit your chosen profession one ha'porth, nay, you will aid to drag it down, to clip its wings and keep it where it has been too long, in the dog-eared volume of every man his own horse doctor, in the chest where the blacksmith keeps his spare nails and oakum, or the livery stable man his winter blankets.

If you can do no more, make a careful record of facts, and publish them every once in a while for those more favored by circumstances to draw inferences from, report your unsuccessful cases as well as those redounding to your credit, and so aid in suppressing the worm in the tongue, the wolf in the tail, and the salt mackerel for the loss of cud of our generation.

ART. XIII.—SULPHURETTED HYDROGEN AS A PRODUCT OF INDIGESTION, AND ITS ACTION UPON THE SYSTEM.

BY JOHN A. MCLAUGHLIN, D.V.S.

For a long time the subject of indigestion has been of more than ordinary interest to me; in fact, I may say it constitutes a hobby with me; a hobby which I am by no means ashamed of; a hobby which, if a few more veterinarians would indulge in, even though they should become enthusiastic on it to the verge or even the lowest depths of fanaticism, would, when firmly convinced, be of decided benefit to our profession.

When I speak of indigestion, I include not only those disturbances which affect the alimentary canal, but the functional derangements of the liver as well, either of which may be an outcome of the other, though not necessarily so.

The process of digestion and the functions of the liver are absorbing physiological studies in themselves, but if we will but go beyond these studies in the abstract, and see how many diseases are but the outcome of a disordered digestion, the profession will not marvel at my enthusiasm on the subject, but may, instead, permit me to wonder at the many crude conceptions of diseases which many veterinarians, who write for the American veterinary journals, entertain; nor do I allude only to the poor, uneducated, diplomaless country practitioner, but I regret to include many of those holding diplomas, and priding themselves on their *Alma Maters*, and even being in charge of "chairs" in our "Veterinary Colleges."

In an article* which appeared in the May number, 1884, of the *U. S. Veterinary Journal*, I maintained that Azoturia was due primarily to a functional disturbance in the liver; I still, after several months, entertain similar views, and my treatment of it, and similar disorders, which has been mainly directed at the liver, has proved extremely gratifying. But it is not of Azoturia I would speak, though I wish to call to mind the paralysis which is found in that disorder, and a similar symptom in the present case, supposed to be due to an entirely different cause.

About January 30th, a bull bitch about nine or ten years old, was brought to me for treatment; at that time she was suffering from a severe attack of pneumonia, and had been suffering so for about ten days previous; subsequently she developed convulsions, which resulted in a slight paralysis, if I can use that term to designate some loss of power, behind. No one, I believe, will accuse pneumonia of producing the convulsions, though I can readily understand that pneumonia or any sickness is not conducive to an improvement of a disabled digestion; but the fact that the bitch had been covered some two weeks before I saw her, might have had something to do with the dyspepsia and liver trouble from which the animal was suffering, both evidenced by a diarrhœa, the color of the fæces, which were a decided though dirty yellow, and the odor emanating therefrom was something terrific; it surpassed in stench the alleged poor but nevertheless powerful specimen of *sulphuretted hydrogen*, which the professor in chemistry brought to the college one day as an illustration of what he described as a stinking stink. Twenty-four hours afterwards, though the fæces was well covered with ashes and chloride of lime, it caused emesis in a healthy man twenty feet away, and its aroma hung round the locality for a week.

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* **Functional Derangements of the Liver and Azoturia.**

For several days the bitch remained in a dead, heavy slumber, not easily awakened, and recognizing no one. On being stirred up, she would move around for a short time, and if permitted, would then go back to her box, to sleep, or willing to sleep in any place, preferring, however, to lie near the fire, for she was cold, and shivered even in a warm room.

She had her first convulsion on February 2d, about 2.30 A. M., just as I was about to retire, after returning from a call. The second occurred at 11.35 A. M.; the third at 3 P. M., and the fourth and last at 5 P. M. The symptoms of the convulsion were opisthotonos, the head being forced backward until it nearly touched the back, and a struggling with the forward limbs. As the convulsion was an utter surprise to me, and the symptoms were those which might occur in a case of asphyxia, I attempted to loosen the collar; but finding it all right, I immediately opened the door, and permitted the cool air to play upon her. It lasted about one minute. As recovery set in her inspirations became full and deep, and when fully over, she seemed decidedly more astonished and dumbfounded than I was, looking at me with an expression on her face which plainly wanted to know what the trouble was. She was extremely affectionate, and considerably damaged a good suit of clothes which adorned my person with her saliva, which accumulated in her mouth and on her lips during the spell. She whined for a considerable length of time after, but this was in all probability due to her surprise, as her whining was not repeated after her subsequent attacks; otherwise the symptoms were the same, except that she did not recover from the latter ones quite so easily and rapidly, though the difference was but a few seconds. In one of these convulsions I took particular pains to see if she retained consciousness, and am sure she did, for she seemed to look at me with open, grateful eyes, for my assistance in keeping her head from being forced backward. While assisting her head in this manner during the two last convulsions, the head made four or five lateral movements previous to the subsidence of the convulsion. After her three last fits she would fall into her dead, heavy sleep much more quickly than she did after her first. Each fit was rendering her weaker and weaker.

Now, let us arrive, if possible, at a cause of this intense disturbance of the system which resulted in such exaggerated symptoms. Quoting from my own article on "Functional Derangements of the Liver and Azoturia": "It seems not at all unlikely," wrote Dr. Lander Burton, F.R.S., in 1880, "that the liver has got another function besides those usually assigned to it, viz., that of preventing the digestive ferments from reaching the general circulation so as to act upon the tissues." Was it this function of the liver that was affected in this case? I certainly believe it was, and that the convulsions were, in all probability, due to the absorbtion of some poison from the alimentary canal.

It would appear, also, that peptones, when escaping into the general circulation, are depressent agents. Prof. Albertoni has found that peptones have a most remarkable action upon the blood, completely destroying the coagulability in dogs, while they have little power in this respect over the blood of rabbits and sheep. He and Dr. Schmidt-Muhlheim independently made the discovery that peptones prevented the coagulation of the blood in dogs, and the latter, under Ludwig's direction, has also investigated their action upon the circulation. He finds that when injected into the veins they greatly depress the circulation, so that the blood pressure falls considerably, and when the quantity injected is large, they produce a separate condition, complete arrest of the secretion by the kidneys, convulsion and death. From these experiments it is evident that the normal products of digestion are poisons of no inconsiderable power, and that if they reach the general circulation in large quantities they may produce very alarming, if not dangerous, symptoms. "It would appear that in certain conditions, as a consequence of disturbance in the working of the liver, the organism is not only ill-fed from the absence of normal products of assimilation, but is actually poisoned by the presence of products which are positively harmful." (Fothergill.)

It was not, however, the normal products of digestion that were absorbed in this case, at least not entirely, for though there were convulsions, there was no arrest of the secretion of the kidneys, for the bitch urinated immediately after two, if not three, of her fits, and never experienced any trouble in that way, though I can readily understand the symptoms produced by peptones varying greatly in different cases. But there is another factor in this case which I have mentioned, and that is the formation of a powerful disagreeable gas, which was no doubt sulphuretted hydrogen, the formation of which gas in the intestine Fothergill mentions, and suggests the probability of its absorption into the circulation. In this case I believe it was the absorption of sulphuretted hydrogen which was the cause of the convulsions from which the animal suffered. Sulphuretted hydrogen is a powerful poison, and acts on the system in a similar manner to hydrocyanic acid; and the action of this latter powerful poison is thus described by Finley Dunn: "One to four drops placed on the tongue, or within the eyelids of dogs, cats, rabbits, or such small animals, begin to operate in ten to thirty seconds; three or four rapid, labored inspirations, a hurried convulsive expiration, and a *general tetanic seizure* precede death. When life is prolonged beyond a few minutes the general sedative effect of the drug is demonstrated; there is paralysis of mobility, sensibility, and reflex irritability, muscular tremblings and convulsions;" other symptoms are a "profuse salivation, dilatation of the pupil, impaired power of voluntary movement." "According to Dr. Mayer, it acts by paralyzing the heart, being conveyed into the blood, and operating directly on the organ. The pulse is sometimes quickened, at other times reduced in frequency. Occasionally salivation and ulceration of the mouth are produced. When not immediately fatal, the symptoms produced are sudden loss of sense, trismus, difficulty and rattling respiration, coldness of the extremities, immobility, and sometimes contraction of the pupils, convulsions, etc." (Dispensatory). In the case of the bitch there was a decided action on the heart, for although I did not examine it at the time, on the

7th of February, five days later, the pulse was about 78, irregular and intermittent, there was a slight paralysis which has not left up to the present date; it is not entirely confined to the hind extremities, for she seems drawn slightly to one side, which is suspicious, at least, of some trouble in the medulla; there was a check of the breathing at first, and deep drawn inspirations later in the attacks, and some salivation, all of which are symptoms of poison by sulphuretted hydrogen or hydrocyanic acid, the difference in the symptoms being accounted for by the difference in those, which would naturally be expected from an experiment where the poison would be introduced in its pure state into the blood, and its absorption from the alimentary canal, in conjunction with other mal-products, due to a disordered digestion.

The case is of decided interest, and even though a theory is not really correct, it is well to have some basis from which to judge of the proper medicinal remedies to use. In this instance I concluded that the liver was at fault—decidedly at fault—and if the result justifies the treatment (of which I am sadly convinced it does not), I will say that the treatment in this case was perfectly correct, as she never took another fit after the first dose, although she remained very logy and sleepy for several days; for the last three days she has been lively enough, evidently revelling in her usual healthy proclivities for hunting and catching rats.

I have tried to find some history of the animal, and am informed that she never had a fit before, and the astonished expression on her face after the first one, certainly leads me to believe that she was not very familiar with such escapades; but being a remarkably good ratter, she was used by the neighborhood to show her excellence in that delectable pastime, and as a reward for her prowess, and the amusement she afforded the on-lookers, she was doubtless treated in the best manner by those who employed her services.

ART. XIV.—PULMONARY EMPHYSEMA AND ITS RELATION TO HEAVES IN THE HORSE.*

BY PROF. WILHELM DIECKERHOFF,
(Conductor of the Clinic of the Royal Veterinary School, Berlin).

Whosoever, engaged in veterinary medicine, has taken pains to thoroughly study the pathology, the diagnosis and theories concerning the various diseases and abnormal conditions of the organs of respiration, will have noticed how defective our present knowledge of heaves is. Attempts to explain the causes of heaves have never been wanting. In reviewing the history of veterinary medicine, I must admit that some theories were advanced with considerable ingenuity. Perhaps we would have progressed more rapidly in diagnosing the various forms of heaves had it not been for the existence of laws regulating the buying and exchange of heavey horses, which necessitated the most eminent authors to admit of an extensive interpretation of the term heaves, in order to prevent the buyer from being imposed upon. With regard to existing special laws, entitling the buyer to return the horse and reclaim from the seller the purchase money if certain defects can be proven within the time stated by law, it cannot be denied that it would be practical to put numerous pulmonary conditions under the forensic term—heaves.

The definition, defended up to the present time, that heaves is a non-febrile, labored respiration, originated with Lafosse (Cours d'Hippiatrique, 1772), who, as well as his predecessors and immediate successors, located the trouble in the lungs. The proofs that chronic diseases of the heart caused labored respiration (heaves) were first produced by Dupuy and Godine, Jr. ("Elemens d'Hygiene Veterinaire, etc., 1815), whilst roaring was previously defined as a special disease. Since that time contributions on the subject of heaves have never been wanting. The statement of Funke ("Handb. d. Pathol. u. Therap. II. Aufl." Leipsig: 1850), that the various diseased conditions of heaves would in the future, when we became more experienced in the art of diagnosing, be recognized as a special disease, has not been realized. It was not a fortunate proceeding for Gerlach, who deserves great merit for having given a scientific foundation to veterinary jurisprudence ("Gerichtl. Thierheilkunde," 1872) to admit of different forms of heaves. If heaves is not a special, but a whole group of diseases, different in their locality and their nature, it would not be logical to speak of different forms of heaves. I find that I can do justice to the demands of the warranty laws if I divide all the chronic non-febrile diseases and abnormal conditions giving rise to labored respiration, into three groups: 1. Abnormal conditions of the bronchi and lungs (Pulmonary Heaves); 2. Diseases of the heart (Cardiac Heaves); 3. Roaring (Laryngeal and Tracheal Heaves, etc.). The frequent assertions that heaves could be caused by hydrothorax (dropsical heaves of Gerlach), also by abnormal conditions of the diaphragm, especially diaphragmatic hernias, with a protusion of intestines into the thoracic cavity (asthma diaphragmaticum of old authors), and by diseased conditions of the abdominal organs, I do not find justifiable.

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* From the Wochenschrift für Theirheilkunde und Viehzucht.

In discussing this subject I will confine myself to the first-named group (pulmonary heaves). That pulmonary heaves can be caused by various diseased conditions of the lungs, has long been admitted, without any plausible reasons having ever been produced. It would be erroneous to believe that the various forms of pulmonary heaves are always recognized by the symptoms of double expiration and by forced movements of the flanks in respiration. There are forms of pulmonary heaves, and I will mention them later, in which, even after hard labor, double expiration cannot be noticed, in which, rather in consequence of the hard labor, you could only observe a slight increase in the number of respirations, superficial movements of the flanks and an abnormal decrease in the number of respirations when bringing the horse to a halt. Those diseased conditions did not receive that consideration in literature that they were entitled to. I must admit they are not seen so frequently as other forms of heaves, that are so easily recognized by the symptoms of forced movements of the flanks and double expiration. Haubner, Gerlach, and other eminent veterinary authors, consider the last-named forms as being caused by "emphysema of the lungs." Gerlach asserts that abdominal respiration indicates the presence of emphysema. That this is not always the case is easily seen from the fact that in roaring, after hard labor, and in cases of hydrothorax, in which the lungs are compressed and contain but little air, also in cases of fatal internal hemorrhages, the labored respiration, with forced movements of the flanks (abdominal respiration), is the same as in emphysema. With the present condition of affairs, it seems to me that a critical discussion of the relations of pulmonary emphysema to heaves is indicated.

The word "emphysema" means inflation of an organ by the accumulation of gases in its substance or connective tissue. But, as in numerous other instances in pathology, the word "emphysema" has frequently been used independent of its original meaning. In connection herewith I will mention—although it does not properly belong to my subject—that the theory advocated by some authors, that in every case of emphysema you have an accumulation of *air* in the organs, does not prove to be correct. It is well known that, in pathological anatomy, a liver which has become inflated by the gases formed during the process of putrefaction is called emphysematous. In rinderpest and equine distemper, when the course of the disease has been protracted, you will find a general emphysema in isolated cases, which, owing to its mode of development, I have named "emphysema septicum." Quite recently I had a twelve-year-old gelding under treatment, suffering with paralysis of the intestines, a severe peritonitis and septicæmia, caused by a rupture of the rectum. Death ensued after six days. On the third day a slight emphysema of the sub-cutis was discovered on the right side of the neck. The day following the same condition was present in some places on the left side. Dyspnœtic symptoms were absent, and on making a post mortem examination I could not find a trace of interlobular emphysema. In this case, too, I consider that the emphysema was of a septic character. The fœtus of a cow dying intra-uterine, with the membranes still intact, will sometimes become so bloated with emphysema of the entire body, but especially of the sub-cutis, that it becomes impossible to deliver it. In milk fever of cows *(eclampsia parturientum)* you will occasionally find the tissue of the pia mater in the brain distended by the accumulation of gases, which originate in the blood and are forced through the walls of the capillaries by the circulation. Professor Harms was the first to discover this condition. The objection raised to this theory, that, by opening the head, air could have passed into the tissues of the brain, is without reason. Having made numerous post mortems on cows that died of milk fever, I must confirm Harms's statement, and claim the condition to be that of emphysema of the brain. However, I cannot endorse the assertion made by Harms, that the gases are atmospheric.

In numerous diseases I noticed that we can have a formation of gases in the lungs of a horse, the composition of which is not known, produced by the decomposition of inflammatory products or effused blood. The process of decomposition will extend from the original centre, gases entering into the interstitial and sub-pleural tissues to a greater or lesser degree. I have frequently diagnosed this form of pulmonary emphysema *intra vitam* by auscultation and percussion, in croupous pneumonia and pneumo-pleurisy, in catarrhal pneumonia, and in hæmorrhages of the lungs. It is in no way related to heaves. In one case the decomposition of the tissue and the formation of gases extended from the left lung, along the trachea, half way up the neck,, within twenty-four hours before death. In connection with this, I wish to state that when this form of pulmonary emphysema is present you will do well to prognosticate an unfavorable result. Every case I observed terminated fatally.

Authors at the present time consider that an abnormal accumulation of atmosphere in the lungs is the cause of pulmonary emphysema. This theory originated with the eminent French pathologist, Laennec ("de la Auscultation Médiate, etc.," 1819), who was the first to use the word "pulmonary emphysema" in pathology. He was also the first to accomplish a separation of the terms "emphysema vesiculare" and "emphysema interstitiale seu lobulare."

After Laennec, in his classic work described "narrow-chestedness" (asthma) as pulmonary heaves, there was great danger of using this new theory in describing heaves in the horse. Long before this a number of veterinary authors asserted that the narrow-chestedness of man and of the horse must be caused by the same diseased condition. In fact, a number of respected French veterinarians did not hesitate to adopt this new theory in describing heaves. To a great extent, without giving the subject a thought, or examining into the conditions, they assumed that heaves was always caused by a rupture of the alveoli, and by the development of pulmonary emphysema. This unexplained interpretation was objected to by Hutrel d'Arboval, who, through his famous works ("Dictionnaire de Méd. et Chin. Vet.," 1826) influenced the practice of veterinary medicine for over ten years. He stated that he never succeeded in finding the cellular lung tissue filled with air, but always found the alveoli dilated in emphysema. In other respects, Hutrel coincided with the belief that heaves could be caused by numerous diseased conditions.

German veterinary authors mistrusted this new theory for a long time. After Rokitansky taught that vesicular pulmonary emphysema in man was caused by a loss of elasticity of the alveolar parenchyma (atrophy) and a complete disintegration of the alveolar septa (rarefaction des lungengewebes), in consequence of which several alveoli would unite and form a larger cavity, the theory apparently became more acceptable.

It is especially due to Bruckmüller, Haubner and Gerlach that the theory of vesicular and alveolar pulmonary emphysema being the cause of heaves was generally admitted by veterinarians.

For the past twelve years I have endeavored to settle the question of pulmonary emphysema to heaves, in consequence of which I made numerous post-mortem examinations. From my experience I can state that a general and extensive atrophy of the alveolar septa of the lungs, according to the opinion of Rokitansky, never occurs in horses. However, I frequently noticed that small portions of the lung were atrophied in consequence of a chronic diseased condition of the bronchi. This abnormal condition, which is frequently seen in old horses, does not cause respiration to become labored. Notwithstanding that small sections of the lung take no active part in respiration, the capacity of the lungs remains sufficiently large to supply the requisite amount of oxygen. I never found an extensive atrophy of the respiratory parenchyma, respiratory alveolar septa, or enlarged alveolar cavities caused thereby even after having carefully examined a large number of horses to decide this question. Consequently, I am obliged to question the existence of this form of pulmonary emphysema in horses.

Enlarged alveolar cavities (simple alveolarectasie) are frequent. While dying, life will sometimes cease when the act of inspiration is at its extreme limit, even when the horse was not troubled with heaves. A post-mortem reveals the fact that the lungs are filled with air to the extent of their capacity, remaining in this condition for hours, and will float if placed in water; the edges are somewhat rounded and the lungs feel "puffy," as old veterinarians frequently expressed it. I find an appropriate resemblance of touch in the feeling of a cushion moderately filled with feathers. The lungs readily show finger impressions, that disappear gradually. From a pathological anatomical standpoint it might be justifiable to describe this condition as a substantial pulmonary emphysema. But it is then necessary to consider that the condition is not one of disease.

Among small horses, shipped by rail from Russia to Berlin, I frequently had under treatment in the clinic some that were affected with a peculiar lung trouble ("Brust Krankheit"). In order to keep the freight charges low, owners are in the habit of overcrowding the cars. During the journey the horses are not only pitted against one another, but at times are thrown on top of one another. With all this trouble we find associated a constant chaffing, and detrimental drafts of cold air as a cause of disease. A few days following, we find the patient with acute pains in the thoracic cavity and a congestion of the internal organs, whilst we find the mucous membrane of the head, especially the conjunctiva, very pale and frequently anæmic in appearance. The cases generally develop into a circumscribed pneumonia or pleurisy, associated with a diminished peristaltic action of the intestines and a dilatory defecation. Owing to the symptoms which indicate severe pains in the wall of the chest, I have decided to call it "pleurodynia" (myalgia pectoralis) after a term used in human medicine. Horses will grunt when compelled to move, and after pressing the thorax, in consequence of the thoracic pains; respiration is increased from 40 to 50, at times 70 per minute and over, while the pulse generally remains normal, and only at times is increased to 55 per minute. The temperature taken per rectum is rarely elevated. The respiration is deep, with a superficial movement of the flanks, the walls of the chest being fixed, and in the lungs the condition develops, which the eminent pathologist Traube defined as "Volumen pulmonis acutum."

In this disease, which is not exclusively met with in horses that have been shipped, but is also at times produced from other causes, we get an inspiratory dilatation of the pulmonary alveoli, caused by the reduced action of expiration, on account of the severe pains in the walls of the thorax. Owing to the necessity of equalizing this insufficient respiration, the act of inspiration is performed to its extreme limit. But the act of respiration is not labored; on the contrary, there is an abnormal diminished movement of the flanks. Nor do any symptoms of abnormal respiration continue, excepting up to the time of death, in cases that terminate fatally, which usually occurs within two or three weeks, or four or six days. I have had the opportunity to examine numerous horses months after having recovered from pleuro-dynia, and found the respiration normal.

In cases of pulmonary heaves, a post-mortem examination generally, but not always, reveals a dilated lung which also is frequently seen in horses that have never been troubled with heaves. My experience has been, that in the majority of cases this dilated condition of the lungs could not be seen on post-mortem in horses that were afflicted with heaves. Therefore, in cases where this condition is present, it can only be due to the fact that death occurred at the moment of extreme inspiration. A general pulmonary emphysema accordingly has no relative connection with heaves, and it is erroneous to assert that it is the primary cause of heaves.

In horses that were afflicted with heaves, I frequently found on post-mortem examination a partial lobular emphysema. It is not essential to find this condition present, as in numerous cases of heaves (that are not well marked) it is not present. A partial pulmonary emphysema is not characteristic of heaves, as it is frequently found in acute inflammatory diseases of the lungs. Another cause is the increased pressure of inspired air on the lung tissue, to which some portions of the lung succumbs, because the surrounding diseased parts prevent a free and easy dilatation and contraction of the air passages. The development of a partial lobular emphysema, therefore, is due to a deficient respiratory capacity of some portions of the lungs, in consequence of which the pressure of the inspired air is unequally distributed, subjecting some portions of the tissue to an increased abnormal pressure. This increased pressure upon the walls of the alveoli is at times so great as to produce a permanent loss of elasticity. A partial emphysema can develop in any portion of the lungs; I have never discovered it in the central portion, but always on its periphery, most frequently on the edges and less so on the surface. The emphysematous portions are frequently the size of an egg and sometimes the size of a hand. In considering this question, I conclude from previous statements that a partial pulmonary emphysema is only complicated with the primary cause of heaves, and is not the *Ens morbi.*

It has been ascertained that interstitial or interlobular pulmonary emphysema in horses is only a form of heaves, and seldom occurs. Within the past thirty years numerous articles have been published in which it was stated, that after forced and unaccustomed labor of sound horses, a general interlobular and sub-pleural pulmonary emphysema was the result, which would never disappear. I feel satisfied that my observations in relation to the sudden appearance of this unusual form of heaves are in harmony with all statements made in literature. The history of the development of interlobular pulmonary emphysema is not thoroughly understood. It is evident that it must be preceded by a rupture of the walls of the alveoli or of the broncheoli. The rupture is undoubtedly very small, and owing to the contraction of the lungs after death, it becomes still smaller than it was *intra vitam.* It has been positively, but not frequently asserted, that a general pulmonary emphysema is incurable. The atmospheric equivalent is not very great, nor is it readily absorbed by the organs into which it has penetrated, but this is no reason why such a condition should be incurable. It is probable that in numerous cases the rupture of the alveolar parenchyma does not contract, and therefore the emphysema of the interlobular connective tissue and of the sub-pleural spaces maintains itself to such a degree, that the opposing force of the tissues permits the admission of air. In other cases the continuance of emphysema may be due to consecutive changes in the bronchi and broncheoli, that become irreparable.

The frequent occurrence of interlobular pulmonary emphysema in the lobes at the lower edges of the lungs is generally known. This is the result of suffocation during the last acts of respiration, and must be attributed to this cause, because at the time of death all portions of the lungs are no longer equally utilized for this purpose, in consequence of which there is a sudden increased pressure on some parts of the lung tissue, causing a rupture of the alveolar parenchyma or bronchioli. It is still a question to what extent a primarily diseased condition of the bronchi or bronchioli assists in the development of interlobular pulmonary emphysema. In numerous instances I have been enabled to prove that after heaves existed for a number of years, caused by a diseased condition of the bronchial tubes, interlobular pulmonary emphysema gradually developed in that vicinity to a moderate degree, and I believe that the diseased condition of the bronchi favored its development in consequence of the increased pressure of the air on the surrounding tissues.

Interlobular pulmonary emphysema is easily diagnosed when it exists to an extent to enable one to readily recognize an abnormal and labored respiration, or is situated at a point which can be reached by auscultation and percussion. Dry râles, such as whistling, hissing, etc., very prominent during the act of expiration, associated with pleuritic friction murmurs and a tympanitic sound on percussion, are symptoms that will readily enable a veterinarian to make a diagnosis. On the other hand, in considering the question whether, in concreto, interlobular pulmonary emphysema is in itself an absolute abnormality, or only a complication of a diffused bronchial ecstasy, or is in casual connection with putrid degenerating bronchopneumonic or haemorrhagic herds, is difficult to decide, and in some cases can only be decided after having the patient under observation for a few days. It is hardly necessary to mention that the temperature and other symptoms indicating a disturbance of health are of diagnostic value.

Herewith I have stated the relation of pulmonary emphysema to heaves in the horse. It now remains for me to describe the diseased conditions that cause heaves, or rather those that for practical forensic reasons should be considered as pulmonary heaves. So early as the last, and especially in the first half of the present century, veterinary authors recognized the fact that the word "heaves" included a whole group of diseases, and when I look over the works on pathology and monographic researches, I cannot help making honorable mention that some authors, notwithstanding the limited scientific experience of those days, have honestly endeavored to bring about a correct understanding of this subject. That they did not entirely succeed, may be attributed to the fact that the physiological conditions of normal respiration were not understood until a later period.

The necessity of excluding all inflammatory and febrile diseases of the lungs from the group of heaves was taught correctly in principle for a few score years. Even if the authors did not make it a thorough success in this respect, we must overlook it, because the nature of the exudative, suppurative and gangrenous diseases of the lungs were not sufficiently investigated, thermometry was unknown, and the method of examining by auscultation and percussion not thoroughly understood. To-day it is not necessary to make any remarks about the value of these aids in diagnosing.

With good judgment those authors only included such chronic and non-febrile diseases as would give rise to dyspnœa and cause death, not immediately, but only after a long time. They included:

1. Abnormalities, which greatly diminish the contractibility of the lungs, and thereby render expiration so difficult as to necessitate the auxiliary muscles of respiration to come into play;
2. Abnormal conditions, which partly obstruct the atmosphere from penetrating into the respiratory parenchyma;
3. Diseases, which greatly diminish the respiratory surface of the lungs.

This accordingly verifies the statement that the most important, and, I will add, most frequent, forms of heaves are due to diseased conditions of the bronchi and bronchioli. That a chronic inflammation of the bronchial tubes frequently gives rise to heaves, has been prominently mentioned, a long time ago, by the English veterinarian, White, and especially by the French veterinarian, Rodet, in his interesting monograph (*Memoire sur la Pousse*, Paris, 1828). It is to be regretted that Rodet mentions a long list of conditions that do not exist, supposed to develop from the inflammation of the bronchi, as being essential to the development of heaves. His labors would otherwise have been crowned with a more permanent success.

Ad. 1. The diseases of the bronchial tubes that produce the most common forms of heaves, are:

A. A diffused chronic bronchitis, associated with a general bronchial ecstasy. This form characterizes itself in most horses by a dry inflammation of the bronchi and bronchioli (bronchitis *chronica sicca diffusa*, or, as called by old-time authors, "asthma *siccum*"), and not seldom as a mucous catarrh of the bronchial tubes (bronchitis *chronica catarrhosa*, or "asthma *humidum*"). The disease produces a weakness and a paralysis of the muscular tissue imbedded in the walls of the bronchial tubes. Owing to this paralysis, we get an insufficient expiration, in consequence of which it becomes necessary for the horse to breathe with an abnormal frequency, in order to equalize the respiration. I previously mentioned that when this is carried on to an extreme limit it may produce a partial pulmonary emphysema. I will also mention that I have seen cases of diffused bronchitis and bronchial ecstasy which, after continuing for years, caused a development of tracheitis, as well as a gradual emaciation, cachexia and death.

B. Diffused chronic peribronchitis. As the name indicates, this disease runs its course in the peribronchial tissue. We could therefore consider it as bronchitis fibrosa externa. This disease is not so frequent as the chronic bronchial affection mentioned under "A." The cause of heaves in this case is also due to a paralysis of the bronchial muscles. We therefore have no difference in the dyspnœtic respiration from that mentioned under "A." On post-mortem, I found the lungs collapsed, flabby, and on cross section numerous grey-white spots, from the size of a lintel to that of a pea (thickened walls of the bronchi), without any distinct demarcation, surrounded by the flesh-colored lung tissue. From the centre of the grey-white spots I could at times press out a mucous secretion. The mucous membrane of the smaller bronchi and bronchioli was reddened and covered with a thin layer of viscid mucous.

Ad. 2. C. Another disease of the bronchial tubes in horses is one that affects the bronchial mucous membranes, and is recognized by thickening of the same. With a thickening of the mucous membrane, lining the smaller bronchi, there must be a deficient supply of air to the alveoli, in consequence of which we see an excessively increased respiration, associated with a superficial movement of the flanks, and a dilatation of the nostrils at hard labor. I consider this form of heaves as being caused by an endo-bronchitis seu brochiti interna chronica.

Ad. 3. Other diseased conditions that diminish the respiratory surface of the lungs, and are included under the term heaves, are:

D. Fatty degeneration of the lungs, a chronic indurating affection of the parenchyma of the lungs and its interstices, which appears in numerous herds, and at times conglomerated it will extend over a large portion of the lungs. This condition, as I stated in the *Wochenschrift für Thierheilkunde u. Viehzucht* in 1879, p. 14, represents a definite and characteristic disease of the lungs, that is probably caused by a peculiar infection, and the term indurated pneumonia, which term is applied to changes taking place in the simple connective tissue, and is therefore hardly applicable to this disease. I prefer the term "fatty pneumonia;" this term undoubtedly has the advantage of guarding one against mistakes. It is more frequently seen in old than in young horses. In numerous instances I had the opportunity to prove by post-mortem examinations that this disease was the cause of heaves. In such horses that have shown labored respiration for six months, one year or more, the fatty degeneration assumes extensive proportions, whereby the horse is rendered useless. It is incurable. The symptoms are increased respiration and a superficial movement of the flanks.

E. Tumors in the lungs. Frequently we have a formation of numerous secondary sarcomas in numerous herds, seldom a metastatic carcinoma. In gray horses I frequently found on post-mortem examination a melano-sarcoma in the lungs and on the pleura that had been the cause of heaves. If these malignant tumors are located in parts of the lung that are inaccessible by auscultation and percussion, their presence cannot be diagnosed. The symptoms are about the same as those described under D. (fatty pneumonia).

F. Absolute interlobular pulmonary emphysema. It was previously stated that this condition can arise after a single but excessive exertion, and continue as an incurable form of heaves.

In considering this subject it is not my object to go into further details of the etiology and symptomatology of the various forms of heaves. For practical reasons, however, I will make one more statement; I coincide with the opinion of Gerlach, because it has been his as well as my experience, that in order to positively certify as to the presence of heaves, it is necessary that the horse be examined *intra vitam.* From the results of the necroscopy alone, you cannot always prove that the animal was affected with a non-febrile disease during life, nor that the horse was troubled with a labored and increased respiration while at work. In giving an opinion about these conditions we must not forget that a large section of the lungs may be diseased and symptoms of abnormal respiration missing, also that the remaining healthy portion may supply the necessary amount of air for respiration.

ART. XV.—THE HISTORY OF TUBERCULOSIS.

BY DR. ALBERT JOHNE.

[Continued from page 350, Vol. 5.]

THE PRESENT VIEWS AS TO TUBERCULOSIS IN MAN AND ANIMALS AS AN INFECTIOUS DISEASE.

Anatomically speaking, tuberculosis may be looked upon as a destructive inflammatory process which leads to the development of small cellular, non-vascular, granular nodes, that sooner or later undergo cheesy degeneration. This inflammatory process is clinically characterized by its strongly progressive nature. It occurs not only in the organ primarily complicated, but disseminates over the entire organism, and is also transmissible from man to animals as well as from one animal to another, or in other words, it has been proven beyond all question that tuberculosis is an infectious disease, that is completely identical in its characteristics both in man and animals.

No one has better described tuberculosis, from this point of view, than Cohnheim, who does not look upon the purely anatomical nature of the tubercle as an absolutely necessary diagnostic point, but rather that these neoplasms have a common origin wherever found. Neither the cellular character of the nodes, nor the caseation once considered so essential an attribute, can be looked upon as decisive, neither being found *only* in such connection. They can only belong to tuberculosis when by inoculation they produce it. In most cases of natural infections the inficiens finds access to the organism by means of the respiratory track, the lungs being the first to become diseased, and from thence the processes extend over the body. By means of expectoration infectious materials become transported to the trachea and larynx, and by swallowing the same to the intestinal track. In other cases the latter can become infected through food, when the intestinal organs are the primary seat of disease. In such cases the lymphatic organs of the mouth and pharynx frequently become diseased very early in its course with extension to the superior lymphatics of the neck. The œsophagus and stomach often escape attack on account of the rapid passage of the infectious material through these organs, while extensive disease may occur in the deeper seated portions of the canal which extend to the glandular organs of the abdominal cavity as well as the fallopian tubes and uterus. As the inficiens of tuberculosis is excreted by means of the kidneys, these organs frequently become the seat of its peculiar processes, which extend to the ureters, bladder, prostate and testicles. In consequence of infection by means of coitus, the above organs may also be complicated, the inficiens passing inward along the urinary canal.

The condition of infection seems to exactly correspond in man and animals. It matters not whether the infectious material be derived from either the one or the other species, or whether it takes place accidentally or *per intentionem.* This complete correspondence in the manner in which infection occurs in both man and animals adds a strong link to the chain in the identity of the five varieties of the disease.

The dispersion of the inficiens over the organism results in a variety of ways. It has been demonstrated, for a long time, that the disease extends by continuity along the lymph tracks in the interstitial tissue and serous membranes. The manner in which generalization takes place has been described in detail by Ponfick and Weigert. According to these authors, it occurs when the inficiens gains access to the circulation, and is thus carried to all parts of the body.

Ponfick has shown, in these cases, that the *atrium* was to be seen in ulcerations and infiltrations in the thoracic duct; Weigert has demonstrated similar conditions in the pulmonary vein. Lately, Weigert has still more sharply defined the generalization of miliary tuberculosis, and understands thereby the eruption of tubercles in such places that are very accessible to the action of the inficiens by means of the circulation, and excludes the extension of the disease by continuity as belonging to the processes of generalization.

Orth does not admit of any distinction between chronic tuberculosis or phthisis due to caseous pneumonia and acute miliary tuberculosis from the genetic point of view, and explains the microscopic difference in these conditions by assuming that when the infectious elements gain access to the circulation in large quantities, or gradually and in small quantities at a time, or when its action is more of a local character, or whether the individual is more or less resistant to infections, so do the anatomical results have an acute miliary character, or caseous with or without nodular developments.

The peculiar nature of the inficiens in tuberculosis has, until lately, been a matter of discussion and doubt.

The views of Buhl, Rindfleisch, and other clinicians, that the organism itself produced the inficiens, have been satisfactorily contradicted. The clinical fact that a quantity of caseous-necorbic material can be absorbed without tuberculosis following, clearly shows that all such elements do not have specific action, and that, in addition, it is necessary that a specific infectious element be introduced to such material.

Cohnheim says that "only such hyperplastic or inflammatory products which undergo specific, *i. e.*, infectious, tuberculous caseation can be a product of the tuberculous inficiens." A pleuritis which is not followed by absorption, but continues, or relapses, and finally leads to pulmonary tuberculosis, is from the beginning of a specific nature. The same is true of a bronchitis, pneumonia, or hypertrophied lymph gland, which undergo caseation, as they are caused, at first, by a tuberculous, scrofulous virus. Or, as Zeigler expresses himself with reference to the relations of tuberculosis to scrofulosis, "the caseated inflammatory product of scrofulosis is not, therefore, infectious because scrofulous, but because it is already tuberculous, or the inflammatory product has become secondarily infected."

All the clinical facts which have been thus far collected speak most strongly for an organized virus, *i. e.*, one capable of auto-multiplication in a diseased organism as the cause of tuberculosis.

Zuru, 1871, had reported the presence of micrococci in the blood of a cow diseased with tuberculosis; when placed in water they demonstrated an individual movement; the addition of carbolic acid to the preparation caused this movement to cease. Zuru found the same micrococci to be present in the tissue at a point of inoculation as well as in miliary tubercles in the lungs. Chauveau, 1872, discovered corpuscular parasites in tuberculous material; Klebs, 1873, defended a similar opinion. Continued experimentation has given a stronger foundation to these observations. Koch has the credit of removing them from a hypothetical to an exact scientific foundation. In the early part of 1881, Koch, and in 1882, Ehrlich and Baumgarten demonstrated, beyond all doubt, the presence of peculiar bacilli in tuberculous material. Koch and others were soon enabled to cultivate these germs in a pure state, and to successfully produce tuberculosis in animals devoted to inoculation experiments. The bacilli of tuberculosis are described by Koch as nearly filliform, their length being from a half to the whole diameter of a red blood cell. They are frequently found in large masses with the so-called giant cells. These bacilli of Koch distinguish themselves from other fission fungi that have heretofore been connected with tuberculosis by the specific manner with which they become stained, and the fact that they are also immovable and require a long time to multiply.

Koch has been enabled to carry them through numerous pure cultivations, and then to produce general miliary tuberculosis in Guinea-pigs, rabbits, rats, mice, dogs and cats by inoculation. It mattered not whether the original material was derived from man or animals, the results were always the same, and corresponded exactly with those obtained by other investigators.

Koch considered the bacilli to be such a characteristic element in tuberculosis that he declared that, with the demonstration of the presence, it was possible to draw the limits as to what was or was not tuberculosis in a more certain manner than we had ever before been able to do. In the future this difficulty will no longer trouble either pathologists or clinicians. Cohnheim and Koch both agree that it is not the anatomical construction, but the etiological proof of the presence of these specific bacilli that will be the criterion in the future as to what is tuberculosis.

Assuming this opinion to be correct, we must consider Miliary Tuberculosis, Caseous Pneumonia and Bronchitis, Intestinal and Glandular Tuberculosis, and Perlzucht of Cattle, as well as Spontaneous and Inoculable Tuberculosis in animals as completely identical processes. At least, it is a fact, that the greater part, *if not all*, of scrofulous and joint diseases should be looked upon as true tubercular.

As to the *when and how* these parasites gain access to the organism, Koch has shown that the bacilli of tuberculosis require to their development, a temperature of from 30 to 41° C, and that their development is of a very protracted nature in comparison. As in our climate opportunities for a continued temperature of 30° C for a period of two weeks, the time these fungi require to develop, are not given outside of the animal organism, it is evident that they can only come to development within an animal body.

As by far the greater number of cases of tuberculosis have their origin in the respiratory organs, it is probable that the bacilli gain access with the inspired air. Their immediate origin is easy of discovery. In consequence of the innumerable masses of tubercle bacilli which collect in the caverns in the lungs of phthisical patients, there can be no doubt that they are expectorated with the sputum and subjected to desiccation. The length of time that such material can retain its infectious qualities is shown by inoculations where sputum that has been carefully desiccated for eight weeks caused tuberculosis in Guinea-pigs with the same certainty as fresh material. We are accordingly justified in assuming that earth, floors, clothing, bedding, etc., thus infected can retain its infectious characteristics for a long time, and when it becomes converted to dust and taken up by the air, give rise to tuberculosis in susceptible organisms for a long time.

The infection of the organism by tubercle bacilli is not possible from all kinds of small wounds of the surface, as is the case with the rapidly multiplying bacilli of anthrax. On account of their protracted development it is necessary that they remain fixed upon a nutrient material, and in a protected position, for a long time, otherwise they are easily eliminated. The infectious elements must be deeply introduced to insure inoculation on this account. In the lungs it is the same, stagnating secretions, the loss of epithelium, and deep-seated cavities forming the best seat for their development.

Tuberculosis can only be successfully combatted by putting an end to the means of infection. The diseased organism is to be looked upon as the centre for infection. Two things must be looked upon as the seat of infection from this stand-point: 1st. The sputum from phthisical persons, and substances polluted with the same; 2d. Tuberculosis of animals.

THE ETIOLOGICAL CONNECTION BETWEEN HUMAN AND ANIMAL TUBERCULOSIS.—With the proof which Koch has given of the identity and virulence of both human and animal tuberculosis, this question has assumed a prominent place in the researches of experimental pathologists, viz: Is tuberculosis transmissible from animals to animals, and from them to man, by means of the consumption of flesh and milk from animals having this disease? Gerlach was the first to answer this question in the affirmative. In the year 1875 he considered that he had established the identity of the two diseases, and said: "We have, therefore, not only the right, but the duty, to adapt the result of our investigations to questions of public health. They point to one cause of tuberculosis in man as being in the food we eat."

Zuru, Semmer, Toussaint also held the flesh of tuberculous animals as unconditionally infectious (although to a less degree than genuinely infected material). As tubercles are, however, developed in the interstitial tissue of flesh, as has been demonstrated by Schutz and Leisering, the infections of such meat will naturally depend upon the degree of development of tubercles in the same. Cooking destroys this quality in small pieces, but not in large ones. All other investigators in this important question have adopted similar views.

Klebs takes a more positive position with reference to the flesh of cattle thus diseased, and especially emphasizes the dangerous character of milk from tuberculous cows, its infectiousness depending upon the degree of extension which the disease has acquired in such animal. The inficiens is to be sought in the milk-source in a suspended condition, and is not destroyed by the general manner of cooking. Flemming, Rivolta, Perroncito and Bollinger have all adopted similar views, and endorsed the position assumed by Gerlach. Bollinger considers the danger of transmission to human beings as being greater from the consumption of the milk from such diseased animals than from that of the flesh, as the former is more frequently taken in an uncooked condition, especially by children. The receptivity of the latter for the injurious influences of food far exceeds that of matured individuals. Bollinger even goes so far as to assume that the influence which such food has exerted upon babes may have too often been attributed to hereditary conditions. He also places emphasis upon the general disposition which seems to exist in man to tuberculosis. Bollinger seeks further to support his position by quoting the frequency with which tubercular phthisis is quoted as *causa lethalis* in human statistics: 30.25 per cent. of all deaths in Munich, and according to Koch, one-seventh of all human deaths, are due to phthisis.

As, according to Adam's and Goring's statistics, tuberculosis in cattle seems to increase as age advances, it seems advisable to subject all cows, especially those over six years of age, to a most critical examination. Clinical cases in human beings of tuberculosis traceable to infection from animal products, have, as yet, not been conclusively proven. Kleuk and Zippelus report such a case, while Dr. Stang in Amerbach reports a case of tuberculosis in a five-year-old child, where no trace of an hereditary influence could be discovered, which had been for a long time fed upon warm milk taken directly from a cow in which tuberculosis was unquestionably proven to exist.

Bollinger, however, has failed to notice quite a number of cases of a similar nature: for instance, Demone, Uffelmann, Ebstein, Hergard, Felizst, have reported such. Zippelus has endeavored to gather statistics with reference to the occurrence of tuberculosis in cows and babes. This important subject needs much more detailed consideration than it has thus far received from Boards of Health. According to Z.'s table, it appears that the death-rate among children under two years old, from tuberculosis, is the greatest in those regions where meat inspection has shown the greatest prevalence of tuberculosis in slaughtered cattle.

Orth also considers the transmission of bovine tuberculosis to human beings as possible, both through consumption of flesh and milk. Cohnheim and Aufrecht both consider the milk of tuberculous cows to be a cause of phthisis mesenterica, the primary intestinal and acute miliary tuberculosis of children. Semmer adopts Bollinger's views. The transmission of tuberculosis to dogs by such food, speaks strongly for these views, for dogs have as little susceptibility to this disease as any animal. Virchow is inclined to the same opinion, though he does not consider that the results of the experiments that have thus far been made fully warrant condemning the meat of such cattle from consumption, as tubercles have not yet been proven to exist in the flesh itself, though the parts infected should not be permitted to be sold.

Toussaint believes that infection results easier when tuberculous material is taken into the intestines than when inoculated subcutaneously. Basing his ideas upon exact experiment, he considers it dangerous to feed meat or its juices, either raw or half-cooked, to invalids or children.

When we carefully consider all the evidence, *pro* or *con*, in this question, as well as the results of Koch's investigations, which absolutely prove the identity and virulence of the disease in both man and animals, we are forced to the conviction that we can no longer doubt the possibility of the transmission of tuberculosis from animals to man through the consumption of the flesh and milk of animals thus diseased. Further investigations must be made in the most exact manner by unquestionably competent persons. Until it has been positively demonstrated that such a possibility does not exist, we must accept the evidence of Gerlach, Chauveau, Klebs and Toussaint with reference to the transmissibility of bovine tuberculosis, and see that the products from animals thus diseased are not sold for human food.

The exact amount of danger, and under what circumstances it is present in such food, is still an open question, as well as the best means to destroy the inficiens so as to make it inactive. We at present know that boiling heat can destroy its virulency, but even cooking for a half an hour is not always sufficient for the heat to penetrate through large pieces of meat. Milk is naturally more securely and easily treated.

(*To be continued.*)

EDITORIAL DEPARTMENT.

THE RELATION OF GENERAL PATHOLOGY TO MEDICAL SCIENCE.

Our readers must have certainly observed that so far as lay in our power we have endeavored to demonstrate the intimate relation existing betwen veterinary and human medicine, especially with reference to questions bearing upon public health. We intend to continue the work, and to endeavor to make this journal the JOURNAL OF COMPARATIVE MEDICINE not only in America but in the world. We cannot help expressing our gratification, a feeling we know our readers will coincide with, on hearing from so many sides "that we had succeeded in making it the best veterinary journal in the English language." With this we are not contented, however; it must be more than that; it must be accepted as an authority among the medical journals of the United States, and hence, so far as in our power, we intend to devote it to medical reform, and to the establishment of State medicine in the country, which means the inauguration of a national organization of public health officials, of which a competent veterinary police system is but a part. With reference to "medical reform," there is nothing more needed in the medical as well as in the veterinary schools, than that the graduated students should learn not only what disease is by its manifesting phenomena, but what it really is to the eye, and still more of what it essentially consists. In this regard we wish to call the earnest attention of our readers to the following remarks:

If we were to be asked, what is the greatest want in medical education in the United States? we should answer, "pathology." When one speaks of pathology to the average student of medicine, or even to the ordinary practitioner, his conception is always of that which can be seen by the organs of vision, viz., pathological anatomy. This is not the fact. True pathology is what one sees with the intellectual eye; pathological anatomy is but one of the steps, a most important one to be passed over before one can become a pathologist. Pathology, and we use the word always in its true, general, or universal sense, is the conclusion of all medical study. Pathology is the sum total of our knowledge of disease which finds its expression in intelligent practice. The aim of all true medical education should be to produce sharp observers and profound thinkers. The result of this combination is the really great practitioners. To the successful development of medical science it is absolutely necessary that there be a division of labor in the scientific as well as in the practical branches of our work. In the good old days the accumulations of knowledge and the methods of research bore no comparison to what the present practitioner has to contend with, and so we find the entire field of medicine commanded by one man, whom, without any disparagement, we could well name "the maid of all work" in medicine. This period found its culmination in the immortal Bœrhaave, the division of labor being introduced by those eminent men who formed the famous schools that went out from him, Haller, Gaubius and Van Surieten, each of whom, while retaining many of the characteristics of the master, represented in himself, to a varying degree, special work as physiologist, pathologist, or clinician.

Few realize the true meaning of the word "pathology." It is not pathological anatomy alone, as already said: it is the physiology of disease. Physiology is not the histo-anatomy of health any more than pathology is the patho-anatomy of disease. Physiology is the *how*, the reason *why*, of the action of the parts in health, as pathology is of the same in disease. Physiology is the philosophy of health, as pathology is of disease. Histology, whether normal or abnormal, is but the description of facts, conditions, open to ocular demonstration. Physiology and pathology are our explanation of these facts. Pathology is more than physiology, in that when one has completed his studies in anatomy, macro- and microscopy, chemistry, and physics, he can stop in his progress; no further preparatory study is necessary in the field of medicine in order that he may become a physiologist. Physiology has, however, its two great departments: the first, experimental and observational; the second, and greater, that which interprets the facts revealed by the former, the philosophical. The same is true of every other branch of science; each has had its men adapted to the detail work of experiment, observation, and recording of facts.

Then come the exceptional men—those intellectual phenomena who now and again, like comets, appear in the intellectual horizon. Bacon ushered them into the world, and Darwin, Virchow, Huxley, Tindall, Helmholz, Spencer and others have made grand the path of Inductive Philosophy. Such men are the true geniuses of the world; like the others, they are also sharp observers of facts; but beyond the sappers and miners in the field of scientific research, they possessed the powers of generalization; they gathered in the harvest which the others had reaped, and winnowing the chaff from the wheat, induced the general laws as indicated by the facts, and prepared the way for a new and younger corps of reapers to enter the field in further search for new facts.

I have indicated where the preparatory education of the physiologist could stop. Not so with the pathologist. He is the store-house of medical science. He must first become all that the physiologist is; he must acquire the most exact and extended knowledge of what health really is, not only in appearance, but in action, *i. e.*, its phenomena; also of the mysterious ways of development, and the variations from regularity which lead to the production of abnormality. It must be repeated, that without the most exact knowledge of what health is, it is absolutely impossible to have any idea of what disease is. I well remember the words of the greatest friend I ever had, and the teacher who has had the most influence on my life, as one day I was bothering with a pathological specimen: "My boy, throw that away; while with us, spend your whole time with the healthy organs; devote your entire energies to histology and physiology; hear the lectures, and gather all you can from the demonstrations in pathology; then when you leave us, go to Virchow, and there learn what disease is." Those words have never been forgotten. They led to the decision of my course in life.

To all students I again say, Learn what is normal, knowing that you will at once recognize the existence of abnormal conditions; you can thus become good pathological anatomists. Pathologists cannot be produced to order; they are born. Whether they become so or not, is largely due to the circumstances by which they are surrounded. But more: not only must the pathologist be able to read facts as they appear, and interpret their genesis—he must also have the ability to recognize their manner of manifestation, in order to make clear to the student their phenomena in life—that is, to be able to interpret their so-called practical value. Hence it is that even when his studies would appear as if completed with pathological anatomy, it is necessary that he have clinical experience, in order to become a clear thinker and practical teacher.

For my own part, I do not believe that the competent pathological anatomist, and far more the pathologist, can ever make a successful practitioner. He can, and should, become a sharp diagnostician, or even a great surgeon, but his knowledge of disease is such that he soon becomes so sceptical with regard to the value of medicines as to lose all confidence in them in given cases. He feels his own impotence in the presence of such diseases as caseous pneumonia, tubercular phthisis, or the malignant infectious diseases. To faith, a certain amount of ignorance is always necessary. If the pathologist is not, from the nature of his studies and intellectual constitution, suited for a practitioner himself, yet he is the necessary implement which we need, in order that our students shall become, as before said, sharp observers, clear thinkers, good diagnosticians, correct in prognosis, and hence trustworthy practitioners.

"The wheels of the gods grind slowly, but surely," and it now looks as if the pathologists were soon to be ground to dust under the accumulating load that research is gradually placing upon them. Once to be a pathologist it was only necessary that one knew man in health and disease. The birth of modern homo-pathology found its expression in Bichat, Laennec, Dudeytron and the French school of the first half of this century. Thé birth of the new school of pathology found its prophet in the greater master of our day, Rudolph Virchow. Virchow is the first of all the pathologists and patho-anatomists to whom the name of Comparative Pathologist can be given.

It is a grave mistake to call Veterinary, or Zoöpathology, "comparative." Whatever there is of it in existence—and there is little based upon exact research—is due to Virchow and his influence. The truth is that zoöpathological anatomy remains to be developed.

With the increased accumulation of the facts that have been thus far derived from these studies, the principles of general pathology induced from the study of disease in man, find again their confirmation, and we are more and more impressed with the fact that the laws of health and disease are the same wherever we find life.

Comparative Pathology is the study of disease, wherever found afflicting vitality. Not content with including the mammal world within its grasp, it now begins to extend still further, and we hear of studies of disease in fishes, birds, reptiles and even insects. With the accumulation of facts in these directions will come again the necessity of generalization, and the pathologists in the future will find their task still more difficult.

So far we have had only to do with life as connected with nerve-force, so-called animal life, in which there is more or less of a nervous organization. Research has long ago revealed to us that the axiom "Omnis cellula e cellula" could not be thus limited, however. This law was first laid in the study of the vegetable cell, and from thence generalized by Virchow to the animal world. We now find, to a complete comprehension of our work, that we must also extend our studies beyond the animate to the vegetable world, and that he who would become a perfect teacher must make himself acquainted with the general principles of vegetable anatomy and physiology. To the unreflecting student this may appear absurd, but let me assure him that the more general one's knowledge of the phenomena of life the better teacher can he become, and even the better practitioner. Would we could stop here; but further study has shown that vegetable life has also its diseases—that there is such a thing as vegetable pathology, under which lie certain general principles which cannot be ignored. To the sceptic on this point, as to its having any practical value, we would say: select some soft stemmed plant, out of which microscopic sections can be easily prepared, make a cut into it with a sharp knife, let it rest a day or two, inject into the substance of the stem, both above and below the cut, some colored fluid, or treat several stems in one way and another, and compare the microscopic sections with cuts from wound-healing in the mammalia, and you will be surprised at the analogy. There you will see exudation of serum, thickening of the stroma or frame-work, development of nuclei, proliferation of cells, and, if lucky, extenuation or development of the "soft canäle" or sap ducts. You will find the general principles, which have been taught you in your studies of man and animals, still more confirmed. It is for the botanist to collect the facts and to induce the laws they teach. The comparative pathologist has only to adapt them to the general principles of disease, where applicable.

Is our task done? With the study of disease, and as a branch of general pathology, we have still another subdivision to consider.

ETIOLOGY.

Once this was limited to man and his immediate surroundings; causes internal and external, but they did not. extend beyond man. Research has already shown the intimate connection existing between many human diseases and our animal surroundings, either in the form of the food we eat, or as contagion. The study of anthrax and the fact of its communication to man again reveals the necessity of the pathologists having knowledge of the vegetable world. Bacillus Anthracis introduced to us the necessity of the study of that branch of scientific investigation known as mycology.

Pasteur chiefly led the way into this new world of research, while Koch, through the discovery of the value of solid culture media, has more completely developed it, and indicated the way we may profitably conduct the microscopic form of agriculture, and be enabled, without the aid of the microscope, to take the tares from the wheat in our miniature fields, and thus easily obtain "sein-culturen," where before the work was one of infinite labor and uncertainty. While with such germs as those of anthrax and phthisis, the most direct way of obtaining a pure culture is to inoculate a polluted one upon some susceptible animal, and then, with caution, from it upon some appropriate culture medium; by others, that cannot at present be so treated, we are oblige to follow the example of the husbandman and sow the tares and wheat together, then when both have ripened, we can easily separate them by the microscopic examination of the growths, and by studying the nature and appearance of the wheat in the media, soon learn to tell it from the tares, as the husbandman roots the weeds out of his field. He recognizes them by their appearance and manner of growth.

This is one of the secrets of Koch's method.

We have made but a beginning here. It would seem as if every form of bacterial life has some one medium in which it would develop in what is called a characteristic manner, though in others it might bear strong resemblances to other germs. This work requires much ingenuity in this direction, and with the discovery of new media, will be found new means of bacterial diagnosis with but the aid of the microscope.

For example, the celebrated "comma" develops in flesh-water gelatine, in the form of the lower half of a balloon, if the medium is suitably prepared, the basket being represented by the accumulation of the bacilli at the apex or point of the culture, the base being upwards. In blood serum it develops in the exact form of a blown out "cordon;" in both cases looking like a delicate veil in the media, the bacteria being at the bottom. Where developed on glass plates it has an infundibula or funnel-shaped form, being a small dark centre, surrounded by two rings of fluid medium of more or less opacity. In all these cases it readily develops in the ordinary room temperature in twelve to twenty-four hours.

The bacillus of tuberculosis, on the contrary, develops only with satisfaction in blood serum at a temperature of 38 to 40° C, and requires twelve to fourteen days to make its characteristic appearance. The entire work of bacterial study is largely of an empirical nature.

As regards tinction, some bacilli, as those of lupus and tuberculosis, and probably syphilis, have also their specific reaction, and the same will probably be found to be the case with numerous others as we discover and experiment with them.

It is necessary at this time to utter a word of warning against an error and danger that is gradually making its way into the minds of the younger members of our profession.

The hunt after and biological studies of bacteria is not the whole of etiology, nor by any means the fundament of preventive medicine.

Bacteria, or any other such cause of disease, are always to be looked upon as external causes.

The artificial culture of bacteria has shown us that, like the seeds the farmer sows, they will only grow on suitable ground. If the ground is not right, no development. Were this not so we should all die when exposed to infection, or at least become *sick.*

The predisposing causes, or internal conditions, those things which the study of pathology can alone reveal, have by no means lost their value by the discovery of the bacillus of anthrax, phthisis, cholera, or any other disease.

Another thing of equal importance, which must not be forgotten, is the nature of a contagious or infectious disease.

In most veterinary works, and many medical, the authors have so little knowledge of the logic of pathology as to be unable to distinguish between cause and nature.

It is not absolutely necessary to know what the cause is, in order to combat the extension of a contagious disease.

Our work is strengthened thereby and final prevention made more probable in some cases.

The prevention of glanders has not been made more possible by the discovery of Schutz and Lœfler, because we do not know where the bacillus originally develops, and only know that it is connected with the disease and can cause it by inoculation.

The same is true of tuberculosis.

But we do know how to get rid of glanders, because of the study of its nature, its manner of extension—and that by killing all known diseased horses we limit the possibility of extension to the smallest possible degree.

We know the cause of tuberculosis; we also know the nature of the disease. When we stop breeding weak-lunged children, when we stop the intermarriage of such, as well as consumptives, when our social relations become regulated by the principles of preventive medicine, we shall be able to combat the extension of phthisis.

The black death, bubo, pest, small-pox and rinderpest have become almost strangers to western Europe, because we have studied and learned their nature and their manner of extension, though we know nothing of their real cause.

With reference to the value of preventive inoculation as a general means of combatting diseases of a contagious nature, we are still in the very beginning of our studies.

Real prevention will, however, be best attained:

1st. By the study of the nature of disease and taking means to prevent its extension.

2d. By endeavoring to discover its real cause, studying its nature and endeavoring to prevent its development—a much harder task than the former.

This last branch of preventive study is only applicable, *in extenso*, to so-called malarial diseases, that is, such as find the conditions favorable to their development and the life of their cause in the conditions of the earth and air, or dwellings, drains, etc. Anthrax, intermittents, yellow fever, cholera, Texas fever and other such maladies are of this nature.

We have endeavored to outline the work of the general pathologist, and hope we have been able to create some respect for the "theorist" of medical science, in the minds of our readers. B.

THE BUREAU OF ANIMAL INDUSTRY.

ITS GREAT OPPORTUNITY.

With the change of Administration at Washington may come changes in this very important branch of our Government.

It is not going too far to say that the Bureau has not met the demands the country has a right to make upon it, even in things that are possible. Its quarantine arrangements are still insufficient, and fail in that exactness of minutiæ by which only a quarantine can be really said to be such. The genius to arrange these things properly has not yet been secured at Washington.

Another very important error has been in the manner of selecting the subordinates to the Chief Veterinarian. In the first place, the appointment of civilians in the Bureau, such as stock-men, is unwise, as these appointments are optional, not at all a necessity. In their stead two veterinary advisers should be appointed, to be called to Washington as consulting members, when necessary. We are bitterly opposed to appointing laymen on technical commissions. As Mr. Law has said, "they must first be instructed before they can know anything," and they never can be so instructed as to be anything but hindrances.

The manner of appointing the "Special Agents," as they are called, is clearly wrong. When Dr. Loring said they were equally as competent as the Chief Veterinarian of the Bureau, he either under-estimated the latter or greatly over-estimated the former, for not one of them knows sufficient pathology to occupy the position. There is but one way out of this difficulty, and if any one at Washington has any true purpose in him it will be adopted. That is, to establish a patho-mycological laboratory at Washington in connection with the Bureau, and to place at its head the ablest man they can get, capable of speaking and teaching the English language, and to have a sufficient number of assistants, and to give at least three months' instruction to these Special Agents before their definite appointment.

A still better way would be to continue the present men in office for six months, and to place the whole business open to public competition, the Government allowing every veterinarian who would come to such a laboratory to study, $100 a month to pay his expenses, and then to examine all candidates and select the best for its purposes. In founding such a laboratory the Agricultural Department would be taking the most needed step in an absolutely necessary direction, and it would undoubtedly lead to the formation of a National Veterinary, and in the end to a National Institute of Sciences, at Washington.

B.

THE APPOINTMENT OF DR. BILLINGS.

It will be, no doubt, a source of pleasure and satisfaction to our readers to learn of the appointment of our associate, Dr. Billings, to the chair of Pathology and Patho-mycology at the Polyclinic Medical College of this city. The event is an important one in the history of our profession, as heretofore no member of it has held the position of instructor in any human medical school in this country or in England.

Every thoughtful veterinarian cannot fail to see in it an opening wedge which will obtain entrance for him into the ranks of his hitherto exclusive fellow-workers, and that it dates a new era in the history of medicine, which holds out to his profession wider fields of usefulness and honorable distinction.

The Medical College which has inaugurated this new departure in the onward march of Medical Science has reason to congratulate itself on the step it has taken. Comparative medicine is destined to exert a powerful influence for good over her sister science, recalling her from the narrow grooves into which she has run, and placing before her broad pathways which invite to profitable investigation.

We wish Professor Billings success in his new undertaking. C.

THE TORONTO VETERINARY COLLEGE.—The January number of the JOURNAL contains an editorial entitled "Veterinary Questions in the United States," in which we inadvertently ignored the claim of the above named college to be worthy of public patronage. The college in question has well sustained its standard of excellence, and if we object to its two years' course, deeming a longer term of the utmost importance, we do not pretend to condemn the institution itself, as the same objection could be raised against others of high standing.

C.

TO OUR READERS we would say that any of them with time and means at their command can, by careful study of Dr. Johne's paper on Koch, and by experience and perseverance, perfect themselves in the methods of bacterial culture.

This paper is but the introduction of this subject to our readers; we have arranged not only with Prof. Johne, but with other eminent men in Europe, for occasional articles upon this and other important topics, and, as in the past, so in the future, shall spare no labor on our part to make this journal what we ourselves are determined it shall be—the best medical journal in the United States.

We would call the especial attention of our readers and exchanges to Dr. Bang's paper on tuberculosis in the udder of the cow, which we think is one of the most important articles we have ever published, and deserving the utmost attention of veterinarians, medical practitioners, Boards of Health and breeders. The few experiments here made should be repeated in large numbers, so that the evidence must be conclusive.

The duties of State Boards of Health and Agriculture are so plainly evident that comment would seem unnecessary.

Dairy inspection and the absolute isolation of every diseased and suspected cow, with the slaughter of the former, should be the inviolable law in every State.

Food Supply and Contagious Diseases.—It is generally admitted that tuberculosis and other contagious diseases may be communicated to man by means of diseased meat, milk, etc., and the guardians of the public health are becoming more and more convinced of the necessity of legislative action in the matter.

A bill has been lately introduced in the Senate and Assembly of the State of New Jersey, providing for the transmission of power from the State to the local Board of Health to appoint inspectors, subject to approval, who will give their whole attention to the detection of contagious animal diseases, impure milk, infected meat, etc.

It also provides for the punishment of those who deal in unwholesome food of whatever kind.

The careful reader of Dr. Biggs' article on cocaine will, we think, come to the conclusion that its physiological action certainly indicates the practical necessity of experimenting with it, subcutaneously, in cases of tetanus, for it seems as if it was especially indicated for this disease. We would also suggest its application in an experimental manner in the same way to what is called spasmodic colic. It should, certainly, at once give rest to the intestinal muscles.

Contagious Diseases on Long Island.—John Lindsay, D. V. S., of Huntington, L. I., has forwarded to us a statement of the contagious diseases which have come to his notice, as follows:

Anthrax made its appearance on October 14th, in a herd of twenty swine, with a mortality of 40 per cent.; on Oct. 27th, in a herd of fifty, with 10 per cent. mortality. Similar reports come from Babylon.
C.

Bacteria Cultivation.—The July number will contain an article from the pen of Dr. Billings on the above subject, with illustrations of the *modus operandi*, necessary instruments, &c.

Heaves in the Horse.—We are indebted to Dr. J. Gerth, Jr., of Newark, N. J., for the translation of the able article by Prof. Dickenhoff, entitled as above.

OBITUARY.

DR. MELCHIORRE GUZZONI.

Dr. Melchiorre Guzzoni, Professor of Pathology and Director of the Clinic at the Milan Veterinary School, died suddenly on the evening of February 17th, aged 40 years. His death is deplored as an irreparable loss by his colleagues, and by the pupils of the school, where he was held in the highest esteem, and considered an eminent scholar and a successful teacher, and by the profession at large, in which he was numbered as one of its most brilliant members.

CASE DEPARTMENT.

I.—AUTOPSY AT CENTRAL PARK MENAGERIE.

BY DR. H. G. BEYER, U. S. NAVY.

Ostrich, *Struthio Camelus.*—Autopsy, Jan. 27, made three days after death. At this time found the bird already skinned, with its head and upper portion of spinal cord removed; otherwise it was not injured. The body presented a fine muscular and excellent adipose development, the *pannicalus adiposus* being in some places 1½ inches thick, showing that the bird was in a well-nourished condition when he died, and, furthermore, that he could not have been sick for any length of time, but, rather, that death must have occurred suddenly.

As it was desired to preserve the skeleton from injury as much as possible, an incision was made, beginning at the hinder extremity of the carina sterni, passing over the middle xiphoid appendix, and following the median line terminating at the symphisis pubis. This incision was supplemented by a transverse one, carried along the posterior edge of the sternum; the flaps were carefully reflected.

The omentum was now lifted up and examined, together with the distended air sacs underneath, and then cut away; the crop was dissected away from the sternum and pectoral muscles. After this had been done the whole contents of the thorax were dissected out entire from before backwards, and successively examined.

Heart weighed 1¾ lbs ; thickness of wall of right ventricle, ⅜ inch ; that of left ventricle, 1¼ inches ; valves perfectly transparent and normal; pericardium normal.

Lungs weighed 2½ lbs. ; unusually adherent to posterior walls of thorax, and very friable at point of adhesion. They were very much injected throughout, a frothy, sanguinolent fluid oozing out from the incisions into its substance, the greater portion of them showing hepatization, and presenting a dark, brownish red color, harder than normal lung, and sinking in water.

Kidneys weighed 1½ lbs., besides a certain amount of congestion, nothing abnormal about them was observed ; color was a cherry brown ; capsule thin, transparent, and easily removed.

Liver weighed 3 lbs. and 5 oz., and seemed normal.

Intestine, from crop to termination in cloaca, measured 67 feet 3 inches, the duodenum being of a dark red color, very much injected, the veins standing out in prominent relief, the ileum being of a slate color, and likewise injected. The walls of the crop were 1½ inches thick, the crop itself being completely filled with grass, half digested, and pebble-stones.

Urino-genital organs normal (male); penis presented a bone bifurcated and bent at its root.

An incision through the ventral wall of the cloaca brought to light an immense cavity, occupying the entire space between the symphisis pubis and the ventral wall of the cloaca. This cavity was surrounded by a wall of muscles and connective tissue 3-8 of an inch in thickness, and completely filled to distension with a creamy fluid measuring about a pint. This fluid, examined under the microscope, was found to be alive with micrococci in all stages of development and fission ; very few pus corpuscles could be found, and those present were filled with these micrococci, carrying on their devouring work at a rapid rate.

A stone was found in the bird's mouth about ½ inch long in the soft part of the lower mandible, about the situation of the articular, the free end pointing towards the cavity of the mouth, the attached end being embedded in the soft parts ; the whole of it was thoroughly surrounded with connective tissue capsule, and hence had become encysted.

Cause of death seems to me clearly due to an attack of acute croupous broncho-pneumonia.

II.—TWO CASES OF AZOTURIA.

BY J. WALLACE MARSH, D.V.S.

1st Case.—I was called to see a bay mare of very fine conformation, aged six, owned by a farmer and worked as a farm horse usually is. She had stood in the stable for some four or five days prior to the attack, and when taken out she was to all appearances in prime condition of health and spirits. She was harnessed and driven about two miles, when she began to hump or draw up the muscles of the loins; broke out in a profuse perspiration—body trembling violently: was with great difficulty removed to a neighboring stable, where she broke down on the fetlocks behind; went down on the floor three times—managed to raise herself twice, the third time was unable to regain her feet, when she lost all control of the posterior parts. This was the condition I found her in. Entire body terribly convulsed. I proceeded at once to empty the bladder by the use of the catheter. Found the urine to be of a very dark or coffee-color, very thick, consistency of linseed oil or syrup. Specific gravity about 1035. Pulse, 70. Temperature, 103. Muscles of the back and posterior parts rigid and tense. From the history of the case and the symptoms presented I diagnosed this to be a case of azoturia. I at once administered 4 grs. of morphia hypodermically; ordered her to be well covered; rugs dipped in hot water applied to the back; gave a cathartic, also diaphoretic, together with diuretics. Used enemas of warm water. Would say there was great tympanitis of the bowels in this case.

2d Day.—Urine voided readily, and of considerable quantity. Continued treatment.

3d Day.—Applied mustard blister to the back. Other treatment same.

4th Day.—No action of the purge. Gave another cathartic ball, which had no effect. Gave no more, but used enemas. Bowels began to act as normal. Tympanitis reduced. Then commenced to give nux vomica.

5th Day.—Mare was able to get on her feet, but was unable to stand. Had her put in slings, when she gradually began to gain some control of her hind parts, and seemed to improve for about eight days, when, all at once, she began to weaken behind, and her legs to swell. Indications of a cerebral nature presented themselves, and the mare died three days after. I had her fed on wheat bran mashes, and gave plenty of water to drink.

2d Case.—A bay horse, aged 6 years, taken in exactly the same way, only in a still more violent manner. Treatment similar. Gave chloral hyd. to ease and quiet animal. Had to give two doses of aloes to get action of the bowels, when I obtained a purging action, which lasted for about eighteen hours. After this, horse seemed to improve a little, but died on the fourth day, not having any action of the posterior parts.

These cases puzzled me very much, indeed. I perused the report of Prof. Porter, in the JOURNAL, on them, but must say I have my doubts as to the prognosis. In these violent cases will you please advise me. If you can publish these rough descriptions, do so, as it may bring out some other opinions.

Schoharie, New York.

III.—RADICAL CURE OF EXTERNAL PULMONARY HERNIA.

Guglielmi reports a case of a cow being hooked in the thorax so as to cause a large hole, and the exudation of a piece of the lung weighing half a pound. It was dark-blue in color and atalectatic. A strong ligature was placed around the mass, the wound being daily dressed with carbolic solution. In the course of ten days the piece of lung sloughed off, the external wound in the thoracic wall healing nicely. Animal remained completely well.—*Clinica Veterinaria.*

Proceedings Veterinary Medical Societies.

AMERICAN VETERINARY COLLEGE.

The tenth annual commencement of the American Veterinary College was held at Chickering Hall, Wednesday evening, March 4th, 1885. Clark Bell, Esq., delivered an address, Prof. C. A. Doremus awarded the prizes, and Samuel Marsh, Esq., conferred the degrees upon the following graduates: Edwin M. Barnes, Theadore Birdsall, George Bowers, D.V.S., Wessales M. Brodhead, Abraham L. Brown, Robert F. Burleigh, M.D., Martin Cushing, William Dimond, George W. Dodin, Hugh F. Doris, Edward Douglas, D.V.S., William J. Elliott, Owen W. Finley, Jacob F. Folker, Christopher Horseman, Samuel H. Kent, Honore F. Laine, William R. J. Mitchell, James McCaffrey, John N. Navin, Jr., Robert M. Navin, William H. Prophett, Stephen L. Richards, Frederick P. Ruhl, Julius W. Scheibler, Philip H. Seltzer, George M. Steck, Dominick J. O'Sullivan, Alpheus A. Tuttle, John P. Wilson, Haru Taka Yokura.

ONTARIO VETERINARY COLLEGE.

On Thursday night, 26th February, at the semi-weekly meeting of the Veterinary Medical Society in connection with this College, the students presented to Prof. Smith, V.S., the much-esteemed Principal and President of the College, a picture of the Senior Graduating Class of 1884–5. The picture is four feet square. H. Piatt, St. Louis, Missouri, and D. E. McLean, Pilot Mound, Manitoba, in behalf of the students, presented the picture. G. McGillivray, Whitby, Ont., read the address, as follows:

To PROF. SMITH, M.R.C.V.S., Principal of the Ontario Veterinary College.

Dear Sir: Since the commencement of our College course, the greatest of harmony has existed among us as students. Each of us being desirous of obtaining some memento of our college days, decided that a photo. of the class would be the most appropriate souvenir, and as a result obtained this picture, which we decided to present you as an appreciation of the hearty and sincere interest you take in our welfare, and the many kindnesses extended to us during our college course.

We take pleasure in presenting you this picture in behalf of the students whose photos. adorn this board, hoping there is no shadow on it, the original of which shall ever prove otherwise than a credit to the Ontario Veterinary College of which you are the worthy Principal.

Signed in behalf of the Senior Class,

G. McGILLIVRAY, }
D. E. McLEAN, } Committee.
HARRY PIATT, }

Toronto, 26th Feb., 1885.

The Professor replied in an able and appropriate speech.

AN ACT TO INCORPORATE A SOCIETY FOR THE PROMOTION OF VETERINARY SCIENCE AND ART IN NEW JERSEY.

SEC. 1. *Be it enacted,* That any number of persons, not less than ten, who have been and are now connected with the "Veterinary Medical Association of New Jersey," desirous of promoting the interests of veterinary science and practice in this State, may associate themselves together for that purpose, adopt a corporate name and make a certificate in writing of their organization, with the names and residences of the persons making the certificate, and upon so doing shall be and are the "New Jersey State Veterinary Society."

Sec. 2. *Be it enacted*, That such society shall for its first year have the same officers as are now the officers of the "Veterinary Medical Association of New Jersey," shall adopt such Constitution and By-Laws and such rules and regulations as to its officers, its modes of business, and its conditions of membership, as a majority of all members of said society shall approve of.

Sec. 3. *Be it enacted*, That no person not at present a member of the "Veterinary Medical Association of New Jersey," shall become a member of the "New Jersey State Veterinary Society," unless he shall have received a veterinary or medical diploma or certificate from some incorporated medical or veterinary college or school, or have been examined by a Board of Examiners appointed by this Society, and declared competent for veterinary practice in this State; and said Society shall have full authority to judge of their admission, or of their continuance as members.

Sec. 4. *Be it enacted*, That this Society, hereby incorporated, shall have power to use a seal of its incorporation, and to own property to an amount not exceeding one thousand dollars, and in the name of its President and Secretary to sue and be sued.

CORRESPONDENCE.

To the Editors of the Journal of Comparative Medicine and Surgery:

Why do the schools confer so many different degrees when they all mean the same thing? To the uniniated J. Blank, V.S., D.V.S., D.V.M., must seem to be a very learned man, but we know that it would mean no more than simply V.S.

In am sorry that some of our schools are borrowing the "Doctor" from the older degrees; it does not give additional worth to the degree. D.V.S. which is conferred upon the completion of two courses of lectures, cannot be worth as much as V.S., Montreal, which is only conferred upon the completion of three courses of lectures.

The doctorate degrees are worthy, old and honorable degrees; now it seems to me that the idea is to steal some of the honor which these degrees have gained by hard work—centuries of hard work—and to tack it on to a degree which is just born, which can scarcely stand alone, as yet; and perhaps that is the trouble—it cannot easily stand alone, so it seizes the cane and wig from one of the old men (doctorates) and proclaims that it is an old man too; but it does not deceive the world; it will not long at any rate.

Let us cling to the first, to the original, to the most expressive, to the most valuable degree, V.S. If we are ashamed of V.S., let us not deck ourselves out in borrowed plumage—borrowed or stolen honors—but let us cling to V.S., and *make it* honorable.

Then, again, M.R.C.V.S. is an absurdity, and H.F.R.C.V.S. is worse yet.

Why not add the whole alphabet? This only means V.S., and the V.S. could be found somewhere in the alphabet, the same as it can in H.F.R.C.V.S., and about as easily. I do not object to a string of letters after a man's name when every two or even three indicate the completion of a special course of study, but when a man uses three, five or six, the meaning of which might be expressed by two, I say it is absurd.

I greatly respect J. Blank, Ph.B., M.D., V.S., but when I read J. Blank, M.R.C V.S., or J. Blank, H.F.R.C.V.S., I smile.

FLAVEL S. THOMAS, A.M., V.S.

REVIEWS.

THE ANATOMY OF THE HORSE. A dissection guide by Prof. McFadyean, M.B., C.M., B.Sc. Published by Wm. R. Jenkins, Veterinary Publisher and Bookseller, 850 Sixth Avenue, New York. [All rights reserved.] Pp. 374.

This is the first volume of a veterinary character, appearing in the English language, that we have been able to lay down with unfeigned and unmixed satisfaction. Certainly nothing could be more thorough, and expressed in more intelligible language, nor anything in anatomy illustrated better than has been done in this work. The arrangement and classification of the subject matter is beyond criticism. The author has not contented himself with an enumeration and description of anatomical features, aided by figure references, but leads his readers right up to the dissected animal, so minute in all his directions, so reliable in every statement of detail, that with this book and a case of instruments, unaided by any teacher, a student could become an expert anatomist and dissector.

In accordance with the general plan of his work, Doctor McFadyean omits all introductory remarks, and plunges *in medias res*, beginning with the dissection of the pectoral region. In the study of each anatomical locality he states, first, in what position the limb is to be dissected, and then furnishes what is a desideratum in all other veterinary dissecting guides, and attempted, to the best of our knowledge, only in "artists' dissections," a surface topography, indicating the outer markings of the horse's body and their relations to the parts beneath.

We are unable to point out a single error of importance, and even in that chapter where the author alone exhibits some doubt or uncertainty, we see evidences that he has everywhere based his descriptions and figures on his own dissections, and not, as is too often done, and notably so in the case of several recent manuals, on abstracts from Chauveau, Leyh, and others. We have been struck with the fact that hitherto the anatomy of the nervous system of the horse—probably the most neglected, because the most important, next to that of the foot and intestine—has been based on the anatomy of the human brain. Unfortunately, Hippo-anatomists have taken as their models not the best, but the worst descriptions of the human brain. The consequence is that in such a work as Chauveau, for example, the thalamus is enumerated as contained in the lateral ventricle. It is now well settled that in all animals, the greater mass of the thalamus is extra-ventricular. McFadyean shows that he is a cautious writer, and does not speak of things unseen by him, in the foot-note on page 249: "The optic thalamus and taenia semi-circularis are generally enumerated among the objects visible in the lateral ventricle. In the brain of the horse, however, the choroid plexus completely covered from view the optic thalamus and in most cases the taenia semi-circularis." When the student tears away the choroid plexus he destroys the partition which bounds the lateral ventricle internally, and which is attached parallel to the taenia in the innermost one-twentieth of the thalamus (Ripa of Wilder). Among the omissions of the index in this connection, is the "Fimbria," which, in one of the figures, is named "taenia hippocampi."

The illustrations in the text are ample, and forty-eight magnificent colored plates from the author's own dissections, true, for the most part, to nature, are scattered through the volume. We are unable to understand how the publishers are able to offer the work at so low a figure. We have no other suggestions to make with regard to a second edition, which we have no doubt will be called for, than the addition of a plate illustrating the relations of the floating and fixed color, and the substitution of better plates for those showing the brain. The drawings made by the author are entirely true to nature and reliable, but those two, drawn by a professional artist, are below the high standard of the remainder.

In conclusion we can only congratulate the student of anatomy, that a want so long and so grievously felt is at length supplied, the author in having done his work so well, and the publisher for his enterprise and liberality in the line of costly illustrations.

E. C. S.

MANUAL OF THE THEORY AND PRACTICE OF EQUINE MEDICINE, by James Brodie Gresswell and Albert Gresswell. London: Ballière, Tindall & Cox; New York: William R. Jenkins. 1885.

The participation of two brothers—one of whom, a member of the Royal College of Veterinary Surgeons, is a practical veterinarian, while the other is a scholar of Christ Church, Oxford, a graduate "in honors" of the highest school of Physiology and Comparative Anatomy of the same school—would lead one to anticipate an excellent result from their combined labors. If this anticipation is not completely realized, it is due, we believe, rather to the limited size of the work than to any inability on the part of the authors; for what they have done in the three hundred and sixty-seven pages before us has been very well done as far as it goes. The style is clear, the statements brief, and the definitions concise and full. There is a little of everything in the book, and we can pay it no higher and better-deserved compliment than by saying that we only regret on behalf of those who studied veterinary medicine some years ago, that they had at that time no such useful and reliable a manual as this one to study as an introduction to the more thorough, but also more involved and voluminous treatises, which this little volume is not intended to replace, but merely to precede in the curriculum. There is an excellent frontispiece plate representing the *bacillus anthracis.*

E. C. S.

THE GUERNSEY BREEDERS' JOURNAL.—This is the title of a monthly periodical recently established in Westchester, Pa., as the official journal of the Guernsey Breeders' Association. The object of the publishers is to advance the breeding of thoroughbred cattle, and to call attention to the value of the Guernsey breed. The *Journal* is finely illustrated, and will be mailed to subscribers at the low price of $1.00 per annum. We hope to see it obtain a wide circulation.

THE THERAPEUTIC GAZETTE.—This periodical is already so well established that we need not refer to its merits, and the February number well sustains its reputation. The articles "Therapeutic Evidence" and "Cocaine" will be found of special interest. Subscriptions at 1925 Chestnut street, Philadelphia; $2.00 per annum.

BOOKS AND PAMPHLETS RECEIVED.

CONTAGIOUS DISEASES OF DOMESTICATED ANIMALS. Investigations by Department of Agriculture. 1884–1885.

THE OSTEOLOGY OF AMIA CALVA, including Certain References to the Skeleton of Teleosteans. By Dr. R. W. Shufeldt, U. S. Army.

REPORT ON CATTLE, SHEEP, AND SWINE, Supplementary to Enumeration of Live Stock on Farms in 1880. Clarence Gordon, Special Agent in charge. Washington, 1884.

TRANSACTIONS OF THE WISCONSIN STATE AGRICULTURAL SOCIETY, HORTICULTURAL, DAIRYMEN'S ASSOCIATION, and Department of Agriculture of the University. Madison, Wis., 1884.

A CORRECTION OF CERTAIN STATEMENTS PUBLISHED IN THE ZOÖPHILIST, and also a Castigation and an Appeal. By H. Newell Martin, M.A., M.D., D.Sc. Baltimore, 1885.

REPORT OF COMMITTEE ON SCHOOL HYGIENE IN TENNESSEE. By Daniel F. Wright, M.D., Clarksville, Tenn.

ANNUAL REPORT OF THE BOARD OF MANAGERS OF THE NEW YORK STATE REFORMATORY AT ELMIRA, 1884.

TYPHOID FEVER AND LOW WATER IN WELLS. By Henry B. Baker, M.D., Lansing, Mich., 1885.

ADDRESS IN MEDICINE DELIVERED BEFORE THE MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA. By W. H. Daly, M.D.

SHOULD EXPERIMENTS ON ANIMALS BE RESTRICTED OR ABOLISHED?

METHODS OF STUDYING THE PHYSIOLOGICAL ACTION OF DRUGS.

THE ABSORPTION OF SUGAR AND ALBUMINOIDS BY THE STOMACH.

THE THERMIC PHENOMENA IN CONTRACTION OF MAMMALIAN MUSCLES. By Robert Meade Smith, Professor of Comparative Physiology in the University of Pennsylvania.

STUDIES FROM THE BIOLOGICAL LABORATORY, JOHNS HOPKINS UNIVERSITY. Vol. III., No. 2. Baltimore.

PROCEEDINGS OF THE NEWPORT NATURAL HISTORY SOCIETY, 1883–4.

JOHNS HOPKINS UNIVERSITY CIRCULARS.

ANNALS ET BULLETIN DE LA SOCIÉTÉ DE MEDICINE DE GAND.

JOURNALS.—The Veterinarian, London; The Veterinary Journal, London; The Quarterly Journal of Veterinary Science in India; American Veterinary Review, New York; Der Zoologische Garten, Frankfort; Schweizer Archiv fur Thierheilkunde, Zurich; Archiv fur Wissenschaftliche und Praktische Thierheilkunde, Berlin; Wochenschrift fur Thierheilkunde und Viehzucht, Augsburg; Tidskrift for Veterinar-Medicin och Husdjursskotsel, Stockholm; Giornale di Anatomia, Fisiologia e Patologia, degli Animali, Pisa; Il Medico Veterinario, Torino; La Clinica Veterinaria, Milano; La Cronica Medica, Valencia; Journal de la Société contre L'Abus du Tabac, Paris; Kansas City Review of Science and Industry; The College and Clinical Record, Philadelphia; New England Medical Monthly, Sandy Hook; Nashville Journal of Medicine and Surgery; The Southern Clinic, Richmond; The Western Medical Reporter, Chicago; Journal of Cutaneous and Venereal Diseases, New York; Denver Medical Times; The St. Joseph Medical Herald; The Weekly Medical Review, St. Louis; The Polyclinic, Philadelphia; Medical World, Philadelphia; Atlantic Journal of Medicine, Richmond; Texas Courier Record, Fort Worth; The American Journal of Ophthalmology, St. Louis; Pacific Medical and Surgical Journal and Western Lancet, San Francisco; New York Medical Journal; Health and Home, Washington; American Psychological Journal, Philadelphia; Leonard's Illustrated Medical Journal, Detroit; Annals of Surgery, St. Louis; Kansas City Medical Index; Eastern Medical Journal, Worcester; The Therapeutic Gazette, a Monthly Journal, Detroit; Horseshoer and Hardware Journal, Chicago; The Blacksmith and Wheelwright, New York; National Live Stock Journal, Chicago; The Breeder's Gazette, Chicago; Cultivator and Country Gentleman, Albany; Weekly Drover's Journal, Chicago; The Chicago Tribune; Indiana Farmer, Indianapolis; Jersey Bulletin, Indianapolis; The Guernsey Breeders' Journal, Westchester, Pa.; Colorado Farmer, Denver.

NEWS AND MISCELLANY.

Personal.—Dr. William Osler of McGill University and Veterinary College, Montreal, has received a unanimous invitation to the chair of Pathology in the University of Pennsylvania.

W. L. Zuill, D.V.S., of Philadelphia, has been selected to fill the chair of surgery in the Veterinary Department of the University of Pennsylvania.

William Herbert Lowe, D.V.S., has been appointed by Dr. Hunt of the New Jersey State Board of Health one of the State Veterinary Inspectors.

Hog-Cholera.—Dr. A. A. Holcombe, State Veterinary Surgeon of Kansas, has written a special report upon the nature, cause, prevention, and treatment of hog-cholera, which has been published by the State Board of Agriculture, for distribution among the people. Copies can be obtained by addressing Hon. Wm. Sims, Secretary, at Topeka, Kansas.

Brain of Monkey.—There is in the collection of Dr. E. C. Spitzka of this city, the brain of an Entellus monkey (*Semnopithecus entellus*) which had died in the Central Park Zoological Gardens two winters ago, which is interesting owing to the presence of a large cysticercus in the cortex bordering below on the second temporal sulcus. No symptoms were connected with this, as far as ascertainable, death being due to other causes.

Dog Meat as food for Man.—According to the "Veterinary Medical Annales," the Professors of the Veterinary Medical College of Brussels answered the inquiry of the Minister of the Interior, "Is there a reason why dog-meat should not be used as food for man?" The sale of it is now permitted, on an inspection certificate of an authorized veterinary surgeon.

The following are the points for the guidance of the inspector:

1. Lean dogs, or those having symptoms or lesions of serious diseases, such as rabies or even a suspicion of it, rhachitis, dropsy, abscess, tumors of any kind, intestinal, hepatic, peritoneal inflammation, pneumonia, pleuritis, are excluded.

2. Pharynx, stomach and intestines are under all circumstances excluded from sale.

The sale is limited to *one* butcher's-stall, with a sign of "Dog-Meat" for sale.

Only the carcases of dogs that had been slaughtered, or whose death was caused by the loss of blood from a divided jugular, can be offered for sale.

It is not known whether the Belgians have an especial taste for dog-meat; or is the dearth of meat-food so great that this extreme measure must be resorted to? However, *De gustibus non est disputandum.*

NATIONAL VETERINARY ASSOCIATION.—The following officers have been elected to serve for the following year: President, Dr. L. V. Plageman, New York; Vice-Presidents, W. C. Fair, Ohio; William Sheppard, Illinois; J. W. Salladay, Penn.; Corresponding Secretary, W. T. Carmody, New York; Recording Secretary, R. Hardy, Illinois; Treasurer, A. J. Chandler, Michigan.

SELF-MUTILATION IN A LIONESS.—Dr. P. S. Abraham in the *Dublin Journal of Medical Science* states:

On the 18th of May, last year, a fine lioness in the Zoological Gardens, in Dublin, was discovered to have devoured, during the night, some six inches of her tail—the hair, skin, bones, and everything. She did not then touch it for some days, but appeared to be very restless, and on the 27th of the month she recommenced her extraordinary conduct, and demolished, during the night, the greater part of the remainder of the organ. She then rested awhile, but again went at it, and in four weeks from the time she began there was nothing left of her caudal appendage but the "butt"—some four inches or so. The organ was now so short that she could not reach it with her mouth, and it was hoped that in consequence she would resume her usual habit, and be satisfied with the flesh of other animals; but on the 1st of July she began to lick and gnaw off the skin of the dorsum of the right hind paw. The integument and subjacent tissue are seen to be removed from nearly the whole of the extensor surface of the foot, and it is evident that the tendons would be exposed were it not for the granulation tissue which has formed, as a superficial layer, over them. It was quite certain that while all this was going on the animal suffered extreme pain; the stump of the tail was to be seen in a constant state of quiver, and when the back of the foot was gone the leg was drawn up, and the creature limped about the cage on her three legs.

There was nothing apparently to account for this strange behavior on the part of the lioness. She was in splendid condition as regards the fur, flesh, and appetite, and the excretions were normal. It is needless to say various methods were tried to induce her to leave herself alone—complete change of food, sulphur and other aperients, worm-powders, syringing the parts with bitter liquids, &c.—but all with no effect. At last, indeed, it was deemed advisable to destroy her, for her suffering seemed so great, and the extent of the wound on the foot was so large, that, even if she left off eating it, it appeared impossible that it could ever properly heal and skin over.

At an examination of the body, made shortly after death, I found the thoracic and abdominal organs all perfectly normal; the right ovary was larger than the left, and its surface presented several large protrudent Graafian follicles. I was at first inclined to think that this ovary showed considerable abnormality, but after consultation with Dr. Neville, and on its microscopical examination, I think it probable that, beyond some degeneration, it is the seat of no very great pathological change. The brain and spinal cord were not examined.

The lioness, who was about twelve years old, had been in the gardens for five years, and had always been in good health. She had produced cubs three times, but her offspring were, with few exceptions, unhealthy, mostly becoming rickety and dying young. For one year previous to May, 1884, she had not been in season, although formerly she had been tolerably regular in "coming round."

It is well known that foxes and many other animals when trapped by one foot will sometimes gnaw themselves free, and leave a portion of their persons behind; and a gradual gnawing and picking away of the tail has been observed as a not uncommon habit with monkeys in confinement, as well as occasionally in dogs, rats, and some other creatures. The present case, however, does not come under precisely the same category as these, for there appeared to be absolutely no external cause for the procedure, and instead of a gradual gnawing away and disappearance of the organ, large pieces were scrunched off at intervals and swallowed.

I have made a great many inquiries as to similar occurrences in other zoological gardens and menageries, and, on the whole, I am inclined to consider that this departure from the creature's usual habit is due rather to something akin to mental derangement. My inquiries tend to show that the carnivores which have "taken on" in this way have been nearly always females, which have either been very young, just before they began to breed, or old, at the menopause, when their breeding period had come to an end—at any rate, that there has always been some interruption or disturbance of the sexual function; and I venture to suggest that we may look upon this perversion of taste, in our lioness at all events, as one of the manifestations in the lower animals of that protean affection which we call "hysteria.'

SIR ASTLEY COOPER AND HIS OPERATIONS ON ANIMALS.—When Sir Astley was rather old he purchased a splendid country seat near London. As long as he could find a case of disease in his horses, cows, sheep or pigs, he was delighted and attended them with all the interest and fidelity he would have shown to a human being, and often trepanned the head of some favorite ram or ewe in search of the cause of its disease in the head. But the moment he found his stock in perfect condition he at once became restless and unhappy, and sighed for the wards of Guy's Hospital. J. C. P.

VELPEAU'S EARLY CAREER.—Velpeau was the son of a blacksmith in the village of Breches in the province of Loire. His father's library consisted of two books, one the Complete Drover, the other a volume of medical receipts. He learned the latter by heart, and turned his attention to medicine. He went twice a week to a country school 3 miles off, but continued to shoe horses and prescribe for their diseases until his 23d year, although he devoted many hours of the night to improving his mind. Then he set out on foot for Paris, but was obliged to stop at Tours to replenish his purse by horse-shoeing. Arrived at Paris he hired a black coat for 3 francs, which did not fit and contrasted strangely with his country garments. Thus attired he called upon the celebrated Dr. Dubois, offering to become his pupil, who notwithstanding his long-tailed coat and sky-blue pantaloons told him he might have the run of his kitchen until he could ascertain his talents and qualifications. He was soon regarded as a companion and friend by Dubois, as he made astonishing progress in his medical studies and was so diligent and untiring as to acquire in a short time such knowledge of the classics and most modern languages of Europe, including English, as to read them with facility. He was so careless of his dress that an assistant in a watchmaker's shop who was his native friend was requested to keep special watch over him, as he was regarded as a suspicious character, a might-be thief. J. C. P.

N. Y. ACADEMY OF VETERINARY SCIENCE AND COMPARATIVE PATHOLOGY. —A number of veterinary surgeons, residents of New York and its vicinity, assembled in the United States Hotel March 24, and organized what is to be known as the New York State Academy of Veterinary Science and Comparative Pathology. Among those present were Prof. Peter Peters, Prof. James Hamill, Dr. Charles A. Meyer, Dr. Harry D. Gill, and Dr. Thomas Robertson of this city; Dr. Henry E. Early, of Richmond, Staten Island; Dr. L. V. Plageman, Brooklyn, and Dr. William T. Middleton, of Fishkill, N. Y. Prof. Hamill said the purpose of their organization was to bring forward a society of independent surgeons for the promotion of veterinary science and mutual protection. He said 40 years ago an organization of this kind was perfected, but it died out for lack of enthusiasm. Another was formed in October, 1883, but this fell through by the treachery of a clique who wanted to further their own interests. He hoped that nothing of the kind would befall the present society, and he asked his colleagues to leave nothing undone to bring it up to the highest standard. Incorporation papers were drawn up and signed and the meeting adjourned.

THE CUNNING OF THE OPOSSUM.—The cunning of the opossum has been repeatedly called into question; the following remarkable facts, however, suggest the necessity for further observation, before committing ourselves to the absolute denial, which a recent distinguished writer has made. Dr. E. C. Spitzka had a living opossum presented to him in 1879 which he kept alive for some days, before using it for anatomical investigation. It was confined in an oblong box, about thirty inches long, twelve wide, and as many high. This was of wooden boards on all sides except the top, across which slats of wood, were nailed at intervals of not quite an inch. The animal ate greedily in confinement. It was the custom every night to lay a heavy object—on the occasion mentioned a stone—on the top of the cage, as the box was of rickety make, and it was thought that the middle slats could have been forced upwards. One morning, the owner came down to the basement, to which no person but himself had access, and found the stone *nearly in its usual place*, the *slats underneath it gnawed through from the inner side* to the number of three, *but replaced as to direction.* The only explanation is, that the animal had shoved the stone to one side, had gnawed through the bars, gone out, *and returned to its prison,* pulling the bars in place again, and working the stone nearly back to its former place, or that some one had played a joke on the owner, with the purpose of mystifying him—the latter alternative is to be rejected, as it would have necessitated a combination of circumstances scarcely possible. The doors and windows were locked. Jars in which stychninized frogs were confined had been overturned; and much confusion created among the paraphernalia of the laboratory; several of the animals had been devoured, for careful search did not reveal any trace of them, and it was believed that the opossum had eaten them in his nocturnal ramble. The frogs mentioned were kept in chronic stychnine tetanus by mineral doses of acetate of stychnine, insufficient to have affected the opossum.

If the view above expressed be correct, it would show the possession on the part of the opossum of a low kind of cunning in the same direction as its alleged simulation of death. The animal showed skill in escaping, stupidity in returning to prison, and some method in concealing the traces of its escape.

Whether (under this theory) it returned to its prison from sheer habit—having become accustomed to that habitation—or because it associated the idea of abundant food with it, is a question that cannot be answered. It is, certainly, one of the most singular *appearing* set of puzzling facts that has come to the notice of one who has had frequent opportunities of studying the habits of animals kept in captivity. That it deliberately intended to produce deceptive appearances is not supposed, but rather that it replaced the objects in their former position, in obedience to an instinctive tendency to concealment during the day—as it is a nocturnal animal.

A MONSTROSITY.—In the spring of 1881, while in Southern Indiana, the Rev. F. M. Symmes, of Paoli, Ind., brought to my office a lamb or lambs, with the following anatomical structure: The integument from near the middle of the bellies toward and including the hinder extremities was as with separate lambs. From a point just in front of the umbilici the integument was joined and enveloped a double thorax. There are four legs which are in such a position that the legs of each embrace or pass by the other. The two necks were also enveloped by the same skin. The head, having but one mouth, would hardly be called double. The mouth is turned in a direction between the two bodies. The head had four ears, two at the sides and a little anterior to their normal position; and two small ears at the back of the head, joined at the base.

There were two eyes, one a large one, located directly over or back of the nose. It had a very deep and oblong orbit. It had the appearance of having a double pupil, but upon dissection, there was found but a single opening through the iris, with a white perpendicular line in the cornea. The eye was supplied with a single optic nerve which branched at the commissure and had a right and left optic tract. The other, a smaller eye, was at the back of the head, and immediately above the little double ears. This eye had but a rudimentary optic nerve, which was not developed of sufficient length to reach the brain. The orbit of the little eye was composed only of a bony disc which had but a slight connection with the cranial bones.

There is but a single brain cavity. The lateral diameter of the head is the greater; especially the base is wide, where it is attached to the vertebræ. The cervical vertebræ are parallel and face each other. At the beginning of the dorsal section each column makes an acute curve backward; then a more gradual curve forward until the lower dorsal and lumbar vertebræ are again brought parallel These curves to the spinal column give greater expansion and capacity to the single thorax containing a double set of viscera. The ribs of each join on the sternum opposite their fellows from the other vertebral column, thus bringing the two sterni at the sides rather than in front of the vertebræ. On one side, from the fourth to the eighth ribs inclusive, the ribs are joined in one flat, thin bone.

The peculiarities of the viscera, so far as observed, were as follows: There were two larynges, yet each imperfect, with a single pharynx situated between them. The epiglottis of each larynx was normal. The glottides and tracheæ were connected with the œsophagus. The cartilages of the tracheæ were arched in shape and formed lateral segments to the single œsophagus to near half the length of the œsophagus where each trachea separated from the œsophagus forming two bronchi, leading to the lungs on either side. The lungs were separate, forming two right and two left lungs complete. The œsophagus divided at a point just above the diaphragm, one branch going to each of two separate stomachs. All the abdominal viscera were perfect, separate and complete. There were two separate hearts, perfect excepting the exits and entries of the arteries and veins, which were double. There were two aortæ rising from each heart, one branch from each forming a perfect arch with its fellow from the other heart. The other aorta from each heart, being in the normal position of the arch, continued as the thoracic and abdominal aorta, each with its regular branches. The venous arrangement was quite similar and needs no further description.—*D. D. Rose, M.D., in the Weekly Medical Review.*

Progress of Veterinary Science.

Innervation of the Beaver's Tail.—It is a remarkable and noteworthy fact, that while in the Rodentia generally—excepting *Dipus* and the *Leporidæ*—the lumbar enlargement is but feebly marked in the spinal cord, that this feature is exquisitely well developed in the beaver. The enlargement is most noticeable in the sacral nerve origins, and evidently connected with the intelligent use and muscular development of the trowel-like tail. E. C. S.

Fowl-Diphtheria, a disease which has been studied in Germany by Dr. Klebs, has been prevalent this winter in Cairo. It is characterized by copious patches of membrane in the mouth and throat, swelling and ulceration of the neck, and inflammation of the intestines, with abcesses round the anus. Dr. Brugsch has been studying the disease microscopically, and by cultivation-experiments at the Khedivial Laboratory, which he has fitted up with the cultivation-apparatus which is used in Dr. Koch's laboratory. He has found in the membrane, and in the œsophagus, a bacillus resembling that found by Dr. Loeffler in the diphtheria of pigeons; but he has not yet found it in the other organs, nor has he succeeded in inoculating other animals with it.—*British Medical Journal.*

Case of Glanders.—M. Bucquoy has communicated to the Academie de Médecine a case of acute farcy in a coachman, which was treated in his wards at the end of last year. At the necropsy, there were no lesions observed of a special character. Inoculations made on a donkey with pus taken from an articulation of the patient provoked all the symptoms of glanders. Two incisions were made, one on the animal's nasal mucous membrane, the other on the thigh, and death ensued six days afterwards. These inoculations were made on the day that the patient died. The organic fluids collected during the life of the patient and used for artificial cultivations did not produce the typical bacilli described by MM. Capitan and Charrin. The necropsy of the donkey revealed all the characteristic lesions of glanders. Purulent mucus revealed from the animal's nostrils, and used for inoculating a guinea-pig, provoked acute farcy, and resulted in death after a few days. M. Leblanc instituted an inquiry in the stables where the patient had lived, and it was discovered that a horse suffering from glanders had been hidden there.

Cow Surgery.—Dr. J. M. H. Goodman, in *Gaillard's Medical Journal*, says: A valuable milk-cow received an injury, in crossing a railroad track, by an express train, midway between the knee and foot, making a severe lacerated wound, tearing away a large artery. I was unable to control the animal so as to apply a ligature, so made a compress and applied a roller bandage. Over this a thick coating of common pine-tar was applied, considerably below and above the wound, so that all air was successfully excluded, and over this another roller of cloth was applied. An examination of the wound was made in six days, and, to the astonishment of all who had witnessed the first dressing, the wound was almost entirely healed, and that without any suppuration. This wound was of such a serious character that t was proposed to kill the animal, but she was a very valuable cow for milk, and hence the effort, which resulted so favorably.

Accidents Produced by Tincture of Arnica.—A veterinary surgeon,

M. Paul Cagny calls attention in the *Recueil de Medecine Veterinaire,* to the severe symptoms which are often produced in horses, particularly those with a delicate skin, by the free application of the tincture of arnica, and mentions the case of a foal which was kicked by another horse and in which the slight abrasion so produced was treated by the prolonged local application of bandages soaked in pure arnica. The part became swollen and inflamed, and soon had all the appearances due to the action of a powerful vesicant.—*Therapeutic Gazette.*

PROLAPSE OF THE RECTUM IN SWINE CURED BY MEANS OF A METALLIC RING.—It is now thirteen years since I have adopted as a method of cure in prolapsed rectum the application of a metallic ring.

The first case which offered itself was that of a stout pig, about five years of age, in which the protruding rectum formed a tumor of the size of a goose egg. This was found to be covered all around with lacerations produced by friction with the sides of the sty. In order to lessen the size of the tumor free incisions were made and a considerable quantity of blood allowed to escape. Having smeared it well with olive oil I effected a reduction. The metallic ring was next introduced and retained by means of sutures implicating the entire thickness of the sphincter. I then ordered decoctions of linseed and marsh mallow and an oleaginous purge.

I visited the patient on the sixth day and found the cure established. The ring had fallen out and a thick circle of hypertrophied tissue, formed in consequence of the irritation produced by the ring, had taken its place.

I have treated many swine in this way and always with the best results.—*Mazzoli Luigi, V.S., in La Clinica Veterinaria.*

USE OF IODOFORM.—In a horse, ten years of age, castrated when a foal, the scrotal sac commenced to increase in size and become indurated, prominences appearing on its surface, which, in turn, became enlarged and ulcerated. I diagnosed sarcoma and extirpated the prominences, and applied powdered iodoform to the exposed surfaces. In two weeks the entire surface healed, and there has been no sign of a return of the disease since the operation was performed one year ago.

I extracted a hæmatoma from a dog's ear, and inserted into the wound a suppository of iodoform. Cure in ten days.—*G. Gioranoli, in La Clinica Veterinaria.*

PULMONARY DISEASES IN WILD ANIMALS.—At a meeting of the Pathological Society of London, recently, Mr. J. Bland Sutton made an elaborate communication on this subject, in which he gave a general account of the Zoological distribution of certain forms of lung disease among wild animals dying in the Zoological Society's Gardens during the past three or four years. The opinion held by the medical profession and the world at large that wild animals in captivity die from pulmonary tuberculosis lacked foundation, and was certainly erroneous. The conclusions drawn were founded on the following cases. From October, 1881, to December 31st, 1884, the total number of deaths was 2779, made up of 583 mammals, 1408 birds, and 788 reptiles. Of the 583 mammals there were 303 quadrumana, including 7 anthropomorphous apes. Of these five mammals died from pulmonary tuberculosis—namely, a tree-porcupine, eyre, kinkajou, lagotis, and an agouti; only one case of general tuberculosis was seen, and that was in a coatimondi. It was remarkable that all of these tuberculosis animals came from South America and the tropical portions of North America, a region named by zoologists the "neo-tropical region." It differs from all the great zoological divisions of the earth's surface by the almost unequalled extent and luxuriance of its forests, its delightful climate, and the richness and variety of its animal life. It was also the home of the guinea-pig.

Pneumonic phthisis had been seen in twelve cases, of which five were monkeys and the rest carnivora. Even if these cases, by the utmost elasticity of the term "tubercle," be included, tuberculosis was a very infrequent cause of death in wild animals. The lungs in many of the cases of tubercle were examined by Dr. Heneage Gibbes for bacilli, and he found them present, not in thousands merely, but in millions. Dr. Gibbes has worked out some very important facts in connection with these micro-organisms, but this part of the research was left entirely in his hands, and the results will be published in a separate paper. Since mammals in confinement did not die from tuberculosis, it became necessary to give an account of their fatal diseases. It might be broadly stated that each group of animals had certain forms of chest affections common to the group. Thus primates, excluding man, suffered from bronchitis, atelectasis, and lobular pneumonia. Carnivora were exceedingly liable to double pleurisies, lobar pneumonia, and bronchitis; whilst ruminantia had the peculiar disease known as "Perlsucht" (the so-called bovine tuberculosis), bronchitis, and "worm" bronchitis. It will be seen that bronchitis, zoologically speaking, was widely diffused, and this was to be accounted for by the vicissitudes of the English climate, in contrast to the tropical climate, to which many of these animals were accustomed.

Although birds had been excluded from this report, so far as tuberculosis was concerned, yet there was one pathological condition peculiar to them which was of great interest. It was well known that in birds the bronchia were in communication with a series of membranous cavities known as air sacs. It happened, with especial frequency in water-fowl, that the lining membrane of these sacs inflamed, giving rise to exudation. This inflammatory matter coagulated, and often formed a covering half an inch in thickness, which formed an excellent nidus, wherein the mould penicillium might luxuriate and form a thin layer throughout the entire series of these air-chambers. Hunter, Owen, Müller, Robin, and others had noted the presence of mould in the air sacs of birds, but they all seemed to have overlooked the exudation. The interest of this condition lay in the fact that this mould did not confine itself to the air sacs, but even permeated the intercapillary air spaces of the bird's lung, which corresponded to the alveoli of the mammalian lung.

In view of these facts, was it a matter for wonder that, in the human lung, vegetable organisms, a fraction of the size of the spores of penicillium, requiring similar conditions for existence, occurred, such as were recognized under the name of bacilli. It was impossible to narrate all the details of the numerous cases of pulmonary affections which were to be observed. The "field of work" such an inquiry opened up to those who had the leisure and opportunity was immense.—*The Lancet.*

RUDOLF VIRCHOW.

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ORIGINAL COMMUNICATIONS.

ART. XVI.—STATE MEDICINE.*

BY FRANK S. BILLINGS,
Pathologist to the New York Polyclinic School of Medicine.

There is probably no branch of the medical profession for which all questions with reference to State Medicine have more vital interest, than the veterinarian. While the medical practitioner is assured of his social position so long as he attends to his practice, it is essential to the veterinarian that his value as an agent upon the vital matters of public health, as well as upon all questions with regard to contagious animal diseases, be recognized by the State. This is not the case in the United States, and least of all in Massachusetts, hence it is that I have thought it well that we should have some ideas of what is understood by "State Medicine."

The careful student of the medical institutions of the United States must most certainly admit that there is much to be desired and much rottenness to be rooted out before they can become, not only what they should be, but worthy of so wealthy a country and so energetic and practical a people.

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* Read before the meeting of the Medical Editors of the United States, at New Orleans.

In speaking of the "medical institutions" of the country, you must not think that the schools alone are to be the subject for consideration. *They* form but a unit among many, but unfortunately for many schools, as well as for the people and the nation, it is the most important and fundamental unit in the whole organism. If the foundation is weak, the whole superstructure must be in a like condition. Before entering upon the discussion of this, the educational part of our question, it is essential that we come to a clear understanding of what we mean by the "medical institutions" of a country. To this end it is necessary that we define our ideas of medical science.

The ultimate endeavor, or purpose, of medical science, as we understand it to-day, is not to educate practitioners in medicine, i. e., to make doctors alone, but rather to subject all disease to the most searching intellectual, physical, chemical, macro and microscopical analysis possible, in the hope that we may thus be enabled to discover, not only the nature of a given disease, but also the nature of its causes—for all diseases have their internal organismal, or predisposing causes, as well as their external or exciting causes—in order that we may elucidate means by which to prevent the generation of such disease so far as possible in the future. Up to the present time our endeavors in this direction have been almost entirely limited to diseases of an infectious or contagious nature. Our work in the future must also include the so-called sporadic, or, as I would term them, common diseases of life, the chief cause of which is to be sought in the utter ignorance of humanity of the laws of life. The bacillus of ignorance plays a much greater role in the causation of disease than that of phthisis, cholera, or septicæmia, and will be much more difficult to combat and expose.

The world wants an applied physiology suitable to the intelligence of the educated and thinking masses as well as it does for the medical student.

While prevention is the alpha and omega of our endeavors, it is not always of possible attainment, so that the world demands the practitioner to treat its diseases as well as the investigator to search into their nature and causes, and to make experiments as to their treatment.

The individual man naturally looks upon the practitioner as the more important of the two, because it is with him alone that he comes in immediate contact. For the masses, however, and by that we mean the nation as a whole, the investigator is by far the more important, though ignorance still so rules the world that none but the exceptionally educated have as yet recognized the value of this fact. The practitioner needs to learn that even he would be at an intellectual standstill were it not for the men in the laboratories whom he so often styles the "theoretical and unpractical men of his profession."

The medical institutions of a country are:

First, the schools; second, the boards of health, or its preventive force; third, the practitioners.

The science of medicine is the great life-saving service of the world.

The medical institutions of this country should be as much a part of its "life-saving service" as that brave body of men that have been so successfully organized along our sea-board and lake coasts during the past ten years.

Every intelligent person must admit that if the medical institutions of this country should be part of its life-saving service (and in reality almost the whole of it), that they should also be organized and regulated in the same manner as any other branch of the public service. The division of this service has already been stated, but the classification has also another practical value.

We have divided this service thus: I. The educational part. II. The entire hygienic system. These two branches must be entirely regulated and supported by the State. III. The practical division which must be controlled by State, as it is subject to the Hygienic Department, but receives its remuneration directly from the person benefited.

The medical schools are the foundation of this service. It has already been said "that if the foundation is weak the entire organization must be of the same nature."

To the schools we have to look as the nurseries out of which we are to draw our supplies for all parts of this extended and complicated branch of the public service.

What, then, is the work of the schools?

1. The education of scientists capable of teaching others so that they may follow in their paths and become able and enthusiastic investigators into the nature of disease, and everything having an etiological connection therewith.

2. The education of practitioners in the principles which have resulted from such scientific researches, as well as the practical experiences of the world.

Do our schools fulfill these conditions? Emphatically, No!

If we make a careful survey of medical literature, we shall be made aware of the fact that the medical schools of the United States are rendered conspicuous by the almost total absence of contributions to original research.

Practitioners are, and have been, well educated at some of these schools, but the fundamentals upon which teaching depends are nearly all borrowed from continental authors; the practical side is largely American, and if due regard is given to what our European confréres are doing, leaves nothing to be desired in that direction.

Why is it that our schools do not fulfill all the demands we have a right to make upon them? I would have the answer impressed very deeply upon the minds of those having anything to do with veterinary education in this country.

Because there is not a single medical school in the United States that is properly supported and regulated by the State; because there is not a medical school in this country where all the teachers have been selected for their abilities not only to teach well but to investigate; because there are no schools offering free opportunities for men of ability to go and work and lecture as private docents, thereby giving genius a chance for self-support and enthusiasm an opportunity to extend over the land; because we have no school where education is free, where the one purpose is to fulfill its whole duty as a branch of the public service. These ends can only be attained by a national institute of medical science—including animal and vegetable physiology and pathology—supported by the government and regulated by a well selected national board of health. The time has come when we should begin to make Washington the central light of American civilization.

Endowed schools can never meet these requirements. All such schools are private, in that they form no part of the public service. They can never shake off the evil influences which they have inherited from their inception. Speculative schools will not even let science enter their doors, only as they must, in the form of honeyed misrepresentations, to attract the students flying round after cheap and easily gotten diplomas. Up to the present time, every medical school that has been established in the United States has been for the purpose—only of making doctors. The majority of those that I have classed as "endowed" are honest schools, and were established in the earlier days of their respective States, to meet a public necessity. The country was young then; almost its entire population being busied in developing it. Drones and sick people were a luxury the earlier settlers could not afford to have with them. The first they drove out, and they desired the sickness driven out of the others. They wanted doctors. The intelligence of the country has not augmented in any proportion to its increase in wealth and population. It still fails to grasp the mission of medical science in the world, or to realize that its executive institutions should be a part of the public service of the State. It does not realize that research is the foundation of all knowledge, or that "knowledge is the power" by which only we are enabled to prevent the ravages of disease.

It still demands curers only. If we are called before a committee of one of our legislative bodies with regard to any disease that is making itself unpleasantly frequent, they ask us, "what can you do to cure it," not what is its nature. If we speak of making researches into that and after its causes, and the necessity of time and money to make investigations with the hope of preventing it, they immediately put us down as a "crank."

The other class of schools, the speculative, to which may be added those that are run upon the "subscription system"—although incorporated, are only to be condemned. They are the result of unscrupulous greed on the part of selfish and ambitious men who desire to increase their influence and incomes—at any cost to their profession—by being thus enabled to pose as "the learned professor" before an unreflecting public, as well as from the fees of students for whom they feel no responsibility either with regard to the quantity or quality of education given them; and on the other hand, of the action of ignorant, irresponsible and unthinking legislators that are willing to charter anything. In their endeavors to get students, the faculty of these speculative schools have very capacious maws—they send the most astonishing catalogues broadcast over the land, in which they state their advantages one over the other. These illustrated pamphlets remind one very strongly of the advertisements of summer hotels and boarding houses. The buildings and surroundings are very imposing—upon paper—and then there is very great similarity in the characters of the proprietors. In the one case, they care nothing about the intellectual food which their patrons receive; as in the other, with regard to the bodily—they are both alike in demanding prompt and full payment. In 1876 we had some sixty, while in 1885 we are credited with having 134 medical schools in these United States. In some States there are as many as eight of these institutions, and in at least one of our cities there is the same number. The majority of these schools are of the speculative variety. As they are in no sense of the word, of service to the public, there is no valid reason for their existence.

No branch of the public service of a State should have even the suspicion of speculation hovering over it, though all parts of this service should be conducted after the most rigid and exact business principles.

What do we mean by "business principles" with reference to medical schools? The returns which the people have a right to expect are the same here as in any other branch of the governmental service; they are: The devotion to duty of the public official at any cost to himself. Only the enthusiast is fit to officiate in this branch of the service. This spirit can never result from our present school system.

It is said "that there are no classes in America." This is not true, for we have every class of worthy and unworthy society; but the most important one of all to the continued development of a country and the preservation of the public health is the scientific class. These are the sappers and miners who prepare the way and make possible the success of every class in the world. Without this class, of what worth is, the accumulated riches of the world when disease threatens?

In the face of cholera the proud merchant for once bows in proper humility to knowledge, the practitioner for the nonce becomes modest, and the world looks only at the work of the investigators. The people cease to cry for "cure alls," but rather demand that the disease be prevented from landing on our shores.

Let us look at some of the evil results of our medical school system.

1st. Not being scientific, i. e., investigating schools, they have not exerted any influence for the advancement of medical science in the country.

(*a*) The reason for this is, 1st. That they are not State schools; and 2d, Lack of funds. This condition has been rendered still worse by the idiotic chartering of speculative, opposition, or special schools of medicine in numerous States and cities, so that the incomes from students' fees of the original and endowed school has been rendered unnecessarily small.

(*b*) The endowed schools again have been too frequently obliged to depend upon men as teachers in the fundamental branches of medical education that had no especial fitness for the work, except that they were born rich and that some relative had been one of the original founders.

(*c*) These two conditions have exerted a most unfortunate influence in limiting the freedom of the trustees in their selection of teachers, and preventing them from seeking genius wherever they could find it.

2d. The great number of these medical schools, and the fact that the majority of them are speculative, tends to lowering the standard of education, and to the production of an utter want of uniformity in the quantity and quality of education acquired by graduates from different schools either in the same or different States, or what is still more disgraceful, in the same city.

3d. This evil condition of things has resulted in bringing unnecessary disgrace upon an honorable profession, and of lowering the appreciation of the same in the public mind. More incompetent than really trustworthy graduates have thus been enabled to represent themselves as "M.Ds." or "doctors."

4th. So little appreciation have the people of the majority of the States of the value of a thorough education in medicine, that it has thus far been impossible to find intelligence enough in their representatives to regulate the practice of medicine in order to protect the public and reward honest endeavor by passing a law to prevent charlatans from using the title "doctor" as a means of deception.

Medicine being a part of the public service, it should be regulated by the State. If one introduces the questions herein brought to discussion to the attention of the most intelligent of our teachers, or practitioners, he is invariably met with one answer, viz.: "Yes, these things are all too true, but how are they to be obviated?—you must remember that we are but a young country yet."

I may be mistaken, or perhaps over-conceited, but I think I have given more thoroughly honest and sceptical study to these questions than any man in the country, for the reason that I desired to have all these evils avoided with regard to veterinary schools. The causes of these unfortunate conditions are not to be sought in the youthfulness of the United States in comparison with other nations—for it must be remembered that the settlers and immigrants to this country brought and bring with them the average intelligence of their native lands—but rather to two other circumstances, and nothing else.

1st. Our English inheritances; 2d. That we have a representative form of government, i. e., are a republic, which does not represent the acme of intelligence in the country by any means. There is, or has been, no better appreciation of the true relation of medical science to the public in Britain than in America. There is no such thing as organized State medicine either in Britain or any of her dependencies. There, as here, all the medical schools are either endowed or chartered speculative institutions. There, as here, you can find the only veterinary schools in the world that are conducted on the "subscription plan" regardless of every principle of professional honor. They are all "doctor" makers, nothing more. The government assumes no responsibility as to how the instruction is being given, or the examinations conducted at the British medical schools. There is scarcely any original research at these schools. The British government is opposed to it—by enacting a law against the intelligent use of vivisection.

The British government is an improvement upon ours in some respects, in that, if it does not regulate the medical and veterinary schools, it has allowed the respective professions to select their own examining and diploma-granting bodies, and by prohibiting to charlatanry the use of the titles belonging to the regular graduate, has shown that it has some regard for honesty and its duty to the public. Britain has neither a well regulated and organized public health or veterinary police service.

All this ignorance our ancestors brought with them, and we have not improved an iota since that day; in fact we are far behind Britain yet, for she does not cherish, protect and nourish the pestiferous diploma-mills which disgrace many of the States of this Union.

In the United States, the people of which boast so much about their prosperity and intelligence, there is scarcely any such thing as State medicine, no efficient boards of health, no veterinary police organization, no organized market and meat inspection, no trustworthy milk inspection, no inspection of dairies to guarantee to the public that the milk they consume and feed their babes upon is not directly from poorly fed and poorly housed cows, or from animals diseased with garget, or what is worse, tuberculosis.

Not a State in this Union gathers any reliable statistics upon all these questions. Our State boards of health are more or less a farce; composed of men the majority of whom have no knowledge of their duties. Not one of them has a suitable laboratory at its disposal wherein investigations and experiments can be constantly made.

The question is, Why are these conditions peculiarly characteristic of English-speaking countries? It is an axiomatic fact that the more English a people the more inefficient their government upon all questions of the kind we are considering. Another fact of like character has long ago made itself evident to every careful student of the inductive sciences, namely, that original research has prospered, and at present flourishes, among the great civilized nations of the world in direct ratio to the non-republican character of their governments.

In other words, the history of republicanism gives direct evidence that thus far it has been utterly unequal to the appreciation of the great cardinal principle of national prosperity that "public health is public wealth;" that this condition cannot be attained or maintained without the careful regulation of the medical institutions of the country as a part of the public service. That the entire system is embraced under the term of State medicine. From this practical point of view that "public health is public wealth," every republic and every extremely liberal government has been and is an abject failure. Again, whenever we see science flourishing and original research supported under a republican banner, as in France, it is not due to republic statesmanship, but rather that the republic has inherited and has had sense enough, or else was indolent enough, to retain the good of the monarchical institutions which in other ways it superseded. Monarchical France made possible the work of Bichat, Cruvelheir, Laennec, Duypeyton, Magendie, Claude Bernard, Pasteur and others, and monarchical Germany has given opportunity to her Mueller, Helmholz, DuBois—Raymond, Webber, Rokitansky (of Austria), Ludwig, Gegenbaur, Virchow, Koch, and so many others that the world can never pay the debt it owes such governments for the facts which research has given to it, and for the advancement and improvement of the human race, by recognizing that the world owes such men a living.

Put Britain and America upon the stand, and question the hand that records the immortal deeds of the men of science. How much have you done in this direction? Remember we are speaking of State medicine only! Everything that is of public importance is of a political nature, and not one deserves a higher, more disinterested, or non-partisan statesmanship than the questions of public health. All questions regarding the medical institutions of any country, bear so intimately upon its prosperity that the professionals who neglect them or who would leave them to the considerations of the ordinary lay politicians, are false to their duties.

The question then left for us to consider is: Why is it that original research has prospered and public health organizations found the best development under energetic monarchical governments, and not under republican forms? The answer is: In governments "of the people, by the people, for the people," the masses never think of anything outside of their daily routine life; they follow in the ruts, and leave the interests of the country entirely in the hands of party leaders who make a business of politics and not a science of statesmanship.

So long as the cholera is in Europe and business prosperous in this country, the American citizen scarcely thinks it of any account. With it at our doors, threatening his own life and that of those dear to him, he suddenly wakes up and begins to wonder why he has not been better informed in regard to the matter. Then he wants legislation.

There is one practical result to monarchical governments that is to be observed where all the medical institutions are regulated by the State. It is this: Whatever tends to render the State prosperous as a whole, is directly beneficial to the government, and whatever tends to injure any great national interest, and the public health is the greatest, is at once felt by the government. National prosperity means success to the government; national adversity means anxiety, distress, and, perhaps, destruction to the ruling family. Let us make this apparent by some examples:

The loss of 100,000 men from some disease, say cholera, to either France or Germany (the other remaining exempt through the energy and activity of its public health service) would be liable to have an instantaneous effect upon the peace of Europe and the stability of some of its governments. While the "Rinderpest" is but a cattle disease, a severe eruption of it in either of the two deciding nations of Europe, could cause such losses both in food, material and means, as to sensibly weaken it, and hence strengthen indirectly, its opponent. Therefore, an active veterinary police as well as a public health system, is in the interests of every individual citizen, consequently it is the duty of every intelligent government to see that such organizations exist, self-interest has also made them obligatory to continental governments. Semi-barbarian Russia can show us the way in these directions in her most civilized portions.

In speaking of these questions previously, I mentioned the comparatively isolated and favorable situation of our country politically. We are nominally, as well as virtually, the monarch of all we survey. We have no equally powerful neighbors which make it a matter of careful necessity that our government makes a constant and careful study of every little thing which may advance or interfere with the resources of the country. Public health is not, as in Germany, a national necessity, for we are not in the condition in which Heine placed the German citizen when he said that "they married in order to supply food for French cannon." There is as much truth as satire in those words for all the nations of Europe, and if cholera, or any other pest anticipates the wants of the cannon, and the food supply is reaped by the unsparing harvester on his own account, or if this same harvester carries devastation among the herds and flocks of the nation, thereby taking away the means of feeding and owning the cannon's food, they acquire it at all the less cost to the opposing nation. Not one of these questions strike directly at either the prosperity or vitality of our government, and although I did not think of it before, the isolated situation of Britain is also of importance to her, the many wars she has waged having had but little direct bearing on these questions.

But if public health is not a public necessity from this existence or prosperity point of view, to a republic in our favorable position, it is still of vast importance to us, a people from another stand point, and that is the public health. The more healthful a nation is the more it prospers, the more energetic its people, is a question that needs no proof.

A fierce epidemic that threatened the lives of the laborers in the mining regions of Pennsylvania, could, if long continued, almost stagnate the business of this country. The rinderpest starting on the Atlantic seaboard, and following the track of the noted equine distemper of '72, might impoverish the country to a great degree and cause incalculable suffering. The cholera may cost us some valuable and many uncounted lives, and much misery this next summer. But not one or all of these things will, or can, cause the least trouble to the government of the United States. Its geographical position has rendered the nation non-sensitive to any such things.

I think I have made my meaning clear, that it becomes a matter of vital necessity for all governments to support original research in all sciences, and especially in medicine, and that though our government is not endangered, it is no less its duty to fulfil every obligation to the people, to study the needs of the country and not wait until absolute necessity awakens the people, so that they demand this or that.

All true governments must be parental whatever their constitutional form may be. The more truly parental, the more it treats the people, in every part of it, with the impartiality of true parents, the more it studies to ward off injurious influences from all parts, and to strengthen all by chemical researches as to the value of their ore products, by physical ones as to their influence for this or that interest, by researches at national laboratories for new uses of all the products of the country, and last and above all, the more it studies the public health in every particular, the greater will be the public wealth of the nation.

Coming back, then, to the question of our medical institution, we have seen that we are in a really bad condition to fulfill these demands. The first difficulty is to know what to do with our school system and its irregularities in the directions indicated. We are all aware that there are altogether too many cheap and irresponsible schools. We cannot fall back upon two examining and diploma granting bodies, the "Colleges of Physicians and Surgeons," as has been the good fortune of our brethren in Britain.

It must be made possible by concerted effort to make every school of this country begin and end its course on the same dayof the year, and have exactly the same number of courses. It must be made possible to have the education approximately the same at all of them. It must be made possible to put a stop to the chartering, or endowing, of any more schools in any State where one school exists.

We must all of us seek to strengthen the strongest schools in our respective States regardless of our alma-mater. No matter how conservative, dead, or mismanaged it may be we must seek to reform it, and never lend our hand to establish an opposition school. We must remember that medicine is not a business, but a profession, and the schools must be made to pay in delivering the best goods possible.

As to a system of examination for all the schools, one hardly knows what to say. Given State schools, then none but the teachers are suitable for examiners. Under our system, it would seem as if the examining power should rest in the State board of health. A board of health should be composed of a number of the most advanced specialists upon hygiene in the States, one or more hygienic engineers and an accomplished jurist. What party they belong to, or what church they attend, makes no difference so long as they do their duty, the regulation of the practice of medicine.

Though it is now too late to make all the schools State institutions, still they should all be made to wheel into line and become a part of the public service of the State. This is not the difficult task it appears to be. The purpose of this is, that no person shall practice medicine, representing him, or herself, to be either an " M. D."—" doctor," " doctress," " surgeon " or " physician," within the boundaries of a given State, without first having past the legal examination of the State board of health and having received a license to practice, which must be recorded and then entered upon the records of the selectmen, or when possible, of the local board of health of the place where such person settles for practice. Said local authorities should at once verify the license of said practitioner by communication with the State board of health.

Those that have practiced medicine under the above conditions in a given State, should, on leaving said State, have their license endorsed stating their standing, reasons for and date of leaving. If these conditions are accepted as equal to those demanded by the board of health of another State into which said practitioner moves with intent to practice his or her profession, it should only be necessary to present said license from the original State, which, being verified, should be recorded in the new State, and the bearer thereof permitted to practice as previously mentioned.

The medical service of the State should form one comprehensive public health system; this means the regulation of the practice of medicine, the duties of boards of health, meat, market, dairy, milk inspection, etc., it includes the regular veterinary and irregular practitioner in its grasp. There should be a national board of health at Washington, and in each State a State board of health, and in every city and large town a local board of health. In the country districts, each county should have its chief public health official, and should be divided into districts, each of which should also have its officials. Not one of these should be appointed by any local authorities; all should be paid by the State; all should hold position during active life unless removed for incompetency or unfaithfulness; all should be "medical examiners." If injured during public service in any way so as to unfit him for future work, they should be subject to pension.

The medical officers of the State board must, of necessity, be at first appointed by the governor, the engineer and jurists to be selected by the medical officials and confirmed by the governor. All local officials to receive their appointment by public competition before the State board. All vacancies to be filled by the advancement of local officers that have distinguished themselves by faithfulness to their duties. The vacancies of the State board to be filled eventually from the best among the county officials. Before receiving such appointments, or better, before being eligible to competition for vacancies, every applicant should be obliged to attend a special course of study, for which the State should supply the opportunity and material free. Every State should supply its board of health with a chemical, biological and pathological laboratory where continued investigations of an examining. observational and experimental character should be conducted. Where, anyone desiring it, could also go and devote himself to special work in either of these directions, the State supplying all material free. At the same time it should equally serve the place of an advanced school in medical research under the auspices of the State, and for the instruction of candidates for the health organization. I will now close by stating how I would regulate the practice of medicine.

The title being guaranteed only to qualified persons, the hygienic organization formed, the public being left free to choose whom they please to attend their ills, the whole practicing fraternity, be it on the human or animal organism, should be obliged by law to report to the nearest State medical official the existence of the suspicion of any infectious or contagious disease in any individual of either species to whom their services should be called. The State board of health should publish a list of such diseases, as well as the laws for the proper regulation of each according to its peculiar nature.

Any violation of the above regulation should be punished with fine or imprisonment, or both, according to the nature of the case, which should be fixed by law and not left to the courts to decide. Ignorance should never be accepted as a mitigating circumstance.

ART. XVII.—INDIGESTION IN THE HORSE.*

BY CHARLES J. BYRNE, M. R. C. V. S.

In human medicine there are few subjects on which more has been written, and in veterinary less, than derangement of the digestive functions. Most of the veterinary authors have dealt with the subject in a trivial manner, therefore what I am about to read to you this evening is chiefly from notes of my own experience.

It is true, the horse is not subject to anything like the variety of gastric derangements that man is; although living in an artificial state, and on food, in a great measure, artificially prepared for his use, he is not allowed, like man, to overgorge his stomach and derange its functions by excesses in eating and drinking, smoking, etc., but, as a rule, has his food and water carefully dealt out to him in such quantity and quality as will generally insure him against dyspeptic attacks. Nevertheless, circumstances do occur, and these by no means rare, when the necessary attention is not paid to his diet, and serious derangement of his digestive apparatus is the immediate consequence.

Before dealing with indigestion, I shall endeavor to describe to you in as few words as possible, the process of digestion.

In the horse, as in other domestic animals, the digestive apparatus is constituted of a membraneous and contracted canal, which extends under the vertebral column from the mouth to the anus. This tube is lined by a mucous membrane, the organization and functional properties of which, in its *abdominal* section, are of the greatest importance, being the principle seat of the essential phenomena of digestion; whilst the other parts, such as the *mouth*, *pharynx* and *œsophagus*, only serve to take, to prepare, and to introduce the alimentary materials.

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* Read before the Massachusetts Veterinary Association.

Digestion may be said to be the process by which those parts of the food which may be employed in the formation and repair of the tissues, or in the production of heat, are made fit to be absorbed and added to the blood. Pressed by hunger and thirst, (sensations which express the necessity of repairing the general and continuous waste of the system) the animal secures the food which he meets with, or is given to him; previously, however, he takes care to subject it to an examination by sight and smell. Once in the mouth, the sense of taste must be satisfied; whatever is offensive is rejected, the residue is ground down by the teeth, and, while undergoing this process, becomes thoroughly impregnated with saliva, and is thus reduced to a soft, pulpy mass, which very much facilitates the next move, viz.: that of deglutition, or the passage of the food from the mouth to the pharynx into the æsophagus, from thence to the cardiac end of the stomach, where it is mixed with a quantity of mucous, which prepares it to be acted upon by the gastric juice of the true digestive, or pyloric end of that organ. By the agency of this fluid and the movement of the stomach, it is reduced to a semi-fluid consistency, and converted into a uniform pulp called chyme; this is then transmitted through the pylorics into the duodenum, and then mixed with the bile, and the pancreatic secretion and intestinal mucous. It is then in a fit state to have its nutritious parts taken up by the lacteal, which form a close system of vessels upon the mucous surface of the intestines and to be carried by them to the blood, while the indigestible or excrementitious part is moved onward by the peristaltic motion of the bowels and in due time expelled by the anus.

Having thus gone over in a brief manner, the healthy functions of the alimentary canal, I am brought to the more immediate subject of my paper, viz.: *Indigestion in the horse.*

In order that digestion may be perfect and easy, it is requisite that the food should be in a state of minute division. A weak stomach acts slowly or not at all, on tough masses of solid food; and horses, like men, have weak and dyspeptic stomachs. The greedy feeder swallows a great part of his food half masticated; the nibbler frequently disturbs his stomach and bowels with gas. In the former, the delayed masses undergo spontaneous changes which are prompted by the mere warmth and moisture of the stomach, gases are extricated, acids are formed, and the half-digested mass passes undissolved into the duodenum and becomes a source of irritation during the whole of its journey through the intestines. In the latter, (the nibbler) he disturbs his stomach and bowels so frequently with air, as to weaken the whole of the digestive powers, and to render him a dyspeptic subject. His rough coat, tight skin, and emaciated figure prove incontestably that his food passes through the alimentary canal without undergoing due conversion, or without his deriving that benefit from it which the healthy animal does.

I will endeavor to consider this subject under two heads, viz.: the mild form unattended by acute pain, called *chronic;* the other, which takes place suddenly, the symptoms of which are altogether more violent, and which is perilous to the existence of the animal, called *acute.*

In a state of chronic indigestion a horse does not thrive as others do, nor is he capable of doing the same amount of work; his appetite is fastidious—good, and even vivacious at one time, and only indifferent at another; it is sometimes depraved; he is fond of gnawing his rack and manger, is frequently found licking the walls, if any, or whitewash off the partitions. I have frequently seen horses eat any filth, and sometimes their own excrement. The skin, from sympathy with the alimentary canal, has an unhealthy appearance; the coat stares, and the animal becomes more or less hide-bound. The manure has not the natural appearance; at one time it is dark, and at another light colored, and has a very offensive smell. It is usually voided in small hard glazed balls, and if examined, will be found to consist of chopped hay and imperfectly chewed or champed oats. In the stable this is the usual state of the fæces, but in his weak state the horse is easily excited when at work, and purging is the consequence. The urine is also scanty and high colored.

The ordinary seat, particularly of chronic indigestion, is the mucous membrane of the stomach and intestines, and the disease may be defined to consist of a congested state of the blood vessels of that membrane; there is, consequently, a want of the proper secretions and constipation is the result. This torpid, or abnormal state may be produced by many causes, such as irregularity in the quality and quantity of the food, imperfect mastication of food in consequence of diseased or irregular teeth, or from greedy or ravenous feeding, long fasting from food and water, cribbing and quiding from irregularity in the teeth, or bots, previous attacks of acute indigestion, or irregular exercise, disease of the liver, &c. These are among the principle causes of indigestion in the horse.

There are few animals, in their natural state, that are supposed to spend more of their time in feeding than the horse does; and the fact that he has no biliary receptacle, proves the necessity of his doing so, and ought to teach a lesson to all those who are interested in his well-being, to copy the dictates of nature by feeding him frequently.

A long fast renders a horse voracious, like the natural greedy feeder; his food is bolted without sustaining that thorough grinding with the teeth so essential to a healthy system. If allowed, he will sometimes overgorge himself with an indigestible mass to such an extent as to bring about the partial or entire suspension of the movement and secreting power of the stomach, and thus put his life in serious danger from fermentation and rupture.

Wheat or green food is most likely to produce this effect, and especially so, if he be put to severe work immediately, or very soon after feeding. New oats or new hay will also produce it; also debility of the digestive organs, or an unhealthy state of the general system; or it may be caused by excessive fatigue, producing general weakness; cold water given in large quantities too soon after eating, by washing the ingesta from the stomach before it is properly chymified, will cause it; allowing the body to cool too quickly when warm; bad treatment; and so will irregularity of work or nervous excitement of any kind.

The symptoms of the acute form of this disease will depend altogether upon its particular seat. If the horse has overloaded his stomach, he will have excessive nausea, expressed by the drooping of the head, turning up of the nose, attempts to vomit, eructations, a slow weak pulse and great prostration and heaviness, distention of the abdomen and colicy pains. *There may* or may not be sympathetic affections of the *brain*, producing stupor and staggers.

There are many cases where this symptom is not present, though the stomach is distended to the utmost. The horse is frequently attacked in the middle of his work, becomes uneasy and will lie down, and at times at full length, for a considerable period; the extremeties are cold, the mucous membranes are not much injected, the bowels are constipated, the mouth dry and clammy, and the horse has a peculiar haggard countenance, which becomes more and more ghastly as the disease advances; should the stomach burst he becomes pulseless, cold sweats break over him, the mucous membranes are pale as in death, he makes frequent attempts to urinate and to force everything from the rectum, he reels, staggers, and very soon falls headlong into a corner of the building and dies.

Although cases of acute indigestion, such as I have just described, where the disease is altogether confined to the stomach, are by no means rare, still the true seat of the great bulk of our acute cases will be found in the cœcum and colon, that mighty receptacle which indeed, might be called the horse's second stomach, for it is indisputable that large masses of nearly indigestible matter lodge there, no doubt for the wise purpose of extracting from it the last particle of its nutritive properties; and it is natural to expect that where there is the greatest accumulation of aliment, there should be the most frequent derangement of function, and so we find it, for in large practice the treatment of this form of indigestion becomes almost a daily occurrence.

The large masses so frequently accumulated in this part of the bowels, in the heavier classes of horses particularly, becomes a frequent source of irritation, producing enteritis; but far more frequently, that form of indigestion so well known to every amateur in veterinary science under the designation of flatulent colic. The causes of this form of indigestion are nearly the same as those which produce it in the stomach, and which I have enumerated before; but the most common are eating green food to excess, and if wet, the danger is greater.

All kinds of new corn and hay have a great tendency to fermentation, or large masses of any indigestible matter, which has been imperfectly chymified from a defective state of the stomach.

If the horse be attacked in the stable, he ceases to eat, and seems to feel a disgust for all species of food and drink; the head is lowered and occasionally thrown from side to side; if he is at work he becomes suddenly heavy and idle, or perhaps works with more precipitation than usual; he stops, scrapes with his feet and makes some contortions, and strives to lie down; consents to continue his journey only when excited by the voice of his driver and whip; he does not go far before he stops again, looks at his belly and groans, strikes at it with his hind feet, lowers the head and neck, and makes another effort to lie down in spite of whip and voice.

His driver will find it necessary to get him into some stable with as little delay as possible, for very soon the disease becomes aggravated; the paroxysms of pain become more frequent and violent; the horse is out of breath and covered with sweat; he lies down and rolls from side to side; the pulse as yet not much disturbed, except during the paraxysms; the belly is swollen; the nostrils are distended, and the whole frame seems to quiver with agitation; later on he sustains himself with more difficulty, spreads his legs to support himself upright, and will often be found to lean against the stable or wall for support. He now lies down with more caution; he dreads the danger of doing so; he often stretches himself and makes vain attempts to pass his manure and urine; feels a desire to vomit, manifested by the elongation of the head and neck; he frequently belches up gases, which is sometimes accompanied with liquids, mixed with particles of food, which escape by the nose and mouth. The swelling of the belly now augments with fearful rapidity; the right flank becomes elevated; the countenance is expressive of the most intense suffering; the pulse is nearly imperceptible; he is now nearly insensible to everything that is around him, and to everything that you do to him, except, perhaps, that he will refuse to take any draught with all the energy with which he is still capable. The anus, forced out by the intestines, forms a sort of soft tumor which elevates the tail. The skin is now covered with cold sweat, and the pulse completely gone; the air can scarcely penetrate the respiratory organs; the blood circulates with difficulty in the vessels; asphyxia becomes imminent; the animal staggers and may fall heavily; sometimes he is relieved by sitting on his haunches like a dog, but this relief is deceptive; it is the result of rupture of the stomach, intestines, or diaphragm allowing displacement of gas. A moment after he becomes comatose; their is no further relief for him, his vital energy is exhausted and he dies.

I now come to the treatment of the various forms of digestive derangements which I have endeavored to describe in this paper, and in doing so it will be necessary that we consider carefully the causes by which they are produced. In all cases, but particularly in those of the milder form of indigestion, much may be learned from the groom or stable attendant, and it is of the utmost importance to the success of our treatment, that as much of the history of the case be got from him as possible.

First.—If the horse has been irregularly fed, or his work more than ordinarily severe, he should have absolute rest, change of diet, a slight dose of physic, and a few vegetable tonics.

Second.—If the cause is greedy feeding, have his corn ground, hay cut, and a muzzle put on at night to prevent him filling his belly with idigestible matter.

Third.—If the horse is a cribber, let him wear a strap round his neck, and feed totally off the ground.

Fourth.—If the teeth are the cause, remove decayed ones, and the protruding parts of others cut off and rash down.

Fifth.—If from *bots* or other parasites, prescribe for their removal and the disease will subside.

Indeed, many of the milder cases of indigestion may be cured by rest, change of diet and stable management; the body and legs kept warm with clothing and bandages; the stall or box well fitted and kept clean; the food given often and in small quantities—in *Summer* a vernal grass or green food—in *Winter* carrots and half shorts or bran, with his corn or oats. Occasionally small doses of physic followed with tonics. If the animal bites the walls or licks the lime of the same, or eats earth, it is indicative of heartburn. Discontinue his oats and corn for a few days and feed on boiled oats and bran mashes and bi-carb. soda in half to one ounce doses three times a day, and also, as in other cases, small doses of physic and tonics. Severe purging does harm, but mild laxatives with good nursing, change of diet given in small quantities, with moderate slow exercise, will often be all that is necessary.

Now, if the case be an acute one, and the stomach overloaded, it becomes a very serious matter, and it will depend in a great measure on the extent to which that organ is packed, whether any treatment be of the slightest use.

I have examined horses that have died of rupture of the stomach, and found upwards of forty pounds of food in that organ; the ingesta was nearly dry, and had no appearance of having been acted upon in the slightest degree by the gastric juice; that secretion must have been entirely suspended, as well as the movement of the stomach, by the excessive weight of its contents. Medical treatment in cases of this kind must, I fear, ever prove futile in the horse; but fortunately, they are not all so bad, and plenty of cases will be met with where the stomach is overloaded, but only to such a degree that active treatment is often efficacious. In such cases, the object to be aimed at is the expulsion of the contents of the stomach, and the most natural way is to rouse that organ to increased action; and to accomplish this I know of nothing better than stimulants and purgatives. Apply mustard, hot fermentations, warm injections, and order as much gruel to be given as he will take.

While the walls of the stomach are so distended, there is no danger of inflammation; should there be any cerebral symptoms, such as heaviness of the head, leaning the head on the manger, or thrusting it against the wall, a good free bleeding should be added to the stimulants and purgatives.

If the disease should take the tympanitic or gaseous form, the cœcum or colon is its usual seat; the cures for it are innumerable; every quack has his own infallible specific, and most veterinarians have a remedy which they think nearly a cure; but although many cases, no doubt, are cured, still it is beyond doubt many die, and from gaseous distention alone, without a particle of inflammation. Like the previous cases I have dealt with, where the stomach is distended with food, expulsion is the object we have to attain. To have the bowels distended with gas, we must have fermentation; and to have fermentation there must be a mass of imperfectly digested matter in the gut. All agree giving the most powerful stimulants, and there are few who don't think it necessary to combine with them some active purgative.

I condemn the fashion of walking and trotting the animal in such cases.

In despite of all treatment, however sound, both in theory and practice, our cases will sometimes die, and others appear upon the point of bursting.

In such cases I have used the trocar in thirty-one instances, with nine successful results. I believe, however, if it were used earlier than it usually is, the results would be more successful.

ART. XVIII.—BACTERIA CULTURE.

BY DR. F. S. BILLINGS.

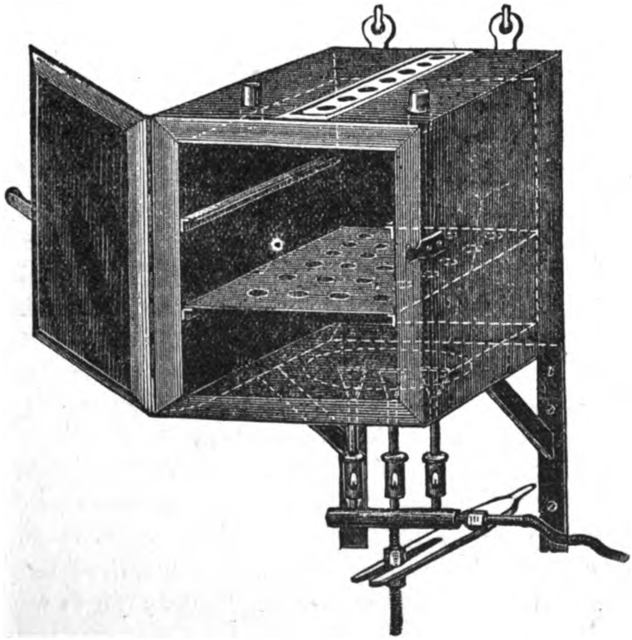
While this subject was introduced by Prof. Johne in the last number of the JOURNAL, it is still of so much importance, and at present so much the rage in medicine, that a further description of its methods seems called for. In all bacterial work the first thing which falls upon us to do is Sterilization. If "Cleanliness is next to Godliness" in society, it is even more than that—it is, above all and everything, the first principle and everlasting rule of bacterial culture and studies.

To Sterilization the first thing necessary is the cleanliest washing possible of all glass, earthen, or tin vessels. After being thus washed, they must be rinsed out with a corrosive sublimate solution (1 : 1000 aq.), then with alcohol, and lastly with distilled water. Flasks, test tubes, and such glasses as will bear heat, should be additionally sterilized in this way also. Iron or steel implements can be sterilized by dry heat only. For the ordinary purposes of the practical doctor, the house oven can be made to answer, if it is carefully watched. The flasks and test tubes, after being washed and rinsed as above, are first to be placed, mouth down, in some iron or glass vessel, and dried in the oven, then they must all be corked with cotton plugs (absorbent), which should not fit too tightly; they are then to be placed in the oven and subjected to the action of heat until the cotton is slightly browned; the processes should occupy an hour or even longer, so that all germs that may have been in the air within the vessels have been killed;

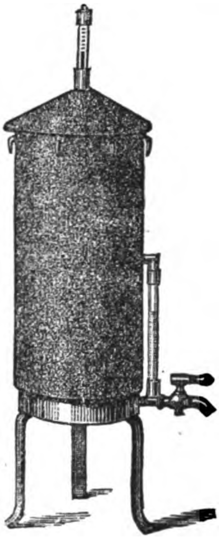
they can now be allowed to cool, and laid aside, and will remain sterile so long as the cotton plug is not removed and the outside air allowed to enter them *en masse*. For those who intend to make detailed studies of bacterial life, or who are engaged in teaching, it is better to have a proper set of sterilizing ovens and implements.

The accompanying cut represents such an oven, which is double-walled and can be made of heavy tin, sheet-iron, or copper. There should be about one inch and a half space between the two walls. The door must be the same as the sides, top and bottom. In the inside should be ledges for two sliding shelves punctured for test tubes, as seen in illustration. The outside bottom should be of heavy copper, in order to withstand the heat. The oven must be so made that this can be replaced when burnt out. The oven here shown has two openings for thermometers, and a damper or regulator on the top. It is made to hang up on hooks, but must be hung away from wood or combustible material.

This oven is 45 cms. high, 28 broad and 28 wide; it requires three burners to heat it up to 150 or 160° Celsus, and costs in Berlin $12.00, when made of heavy sheet iron.



In order to make use of steam as a means for sterilizing many things that we cannot subject to a dry heat without injuring them, we have a cylindrical vessel, made of heavy tin or copper, covered with a heavy felt or asbestos jacket, and about 3 feet in height and 10 inches inside diameter. The accompanying cut represents such an apparatus.



This is useful in sterilizing everything made from gelatine or agar-agar, potatoes or other vegetables, meats, etc., but is not suitable for blood serum. It is supplied with a thermometer. The water is poured in at the top, and not between the walls, and about 1-3 from the bottom is a grate-work on which to set the vessels. This instrument is also convenient in the making of all gelatines, for we can pour them into one large funnel, place it in a flask and in the steam apparatus, fill the latter, place the Brunsen under it and go home and find our gelatine all ready in the morning to pour at once into the test tubes, which should be filled to about 1-3.

For the manner of preparing gelatines the reader is referred to the last number of the Journal, pp. 120 and 121. In preparing potatoes or vegetables, the eyes or any indentations or hoe cuts, and such like, must be first cut out with a clean knife, sterilized in the Brunsen flame, the cut going into the sound substance, and after that scrubbed with a nail brush in corrosive sublimate.

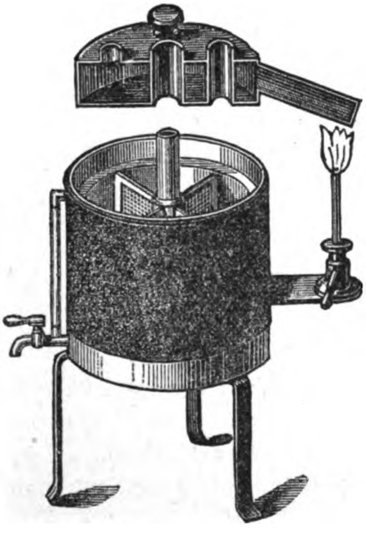
Another cultivating medium is blood serum, which is the most difficult of all to prepare, and requires great delicacy in treatment, so as not to cause the albuminum to coagulate, thus giving us an opaque instead of an amber-colored gelatinous mass.

Every student of medicine should know how to obtain blood serum, and how the placenta sanguiness is formed and the serum separated. Sheep's blood is the best and horse's the poorest for our purpose. Take several tall glass vessels, with ground glass stoppers, sterilize as directed,—vessels should be at least 15 inches high and 6 in diameter,—proceed to slaughring house; if possible have a servant there to wash the necks of two or three sheep first in water and then in sublimate solution, and again in water; have the head well held back; a clean, quick cut, and catch the blood only so long as it runs strong and quickly—close the vessel and wash it off at leisure. The vessels should then be placed in an ice chest for two or three days, until the serum has become thoroughly separated. It is then to be as carefully drawn off as possible with sterilized pipettes, the cover of the glass not being moved more than necessary—sterilized test tubes are to be filled about 1-3.

In filling all test-tubes or flasks the operator must be extremely careful not to touch the sides of the opening of these vessels with the material he is pouring in, for the cotton plugs will then adhere and be troublesome on removing them for inoculation of the tubes. White, not grey, filtering paper must invariably be used. After having filled our tubes with the serum, we come to the difficult parts of the operation, which are:

1. To sterilize the serum without causing it to solidify.
2. To cause it to solidify without coagulation of its albumen occurring.

For this purpose we have the apparatus designed by Koch, and illustrated by the following cut:



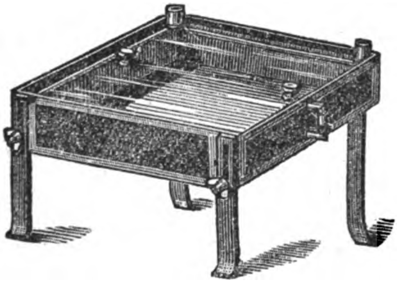
This is a double-walled apparatus, made of copper or block tin, covered with a jacket of felt or asbestos. The cover is also constructed in the same manner. It is divided internally into four departments, for the better arrangement of the test tubes, which are placed standing inside. The walls and top are filled with water, the cock and glass at the left being to draw off and indicate the amount of water. The stand at the right, with the Bunsen, is to heat the water in the cover. The thermostat itself is heated from the bottom. In the cover are places for the thermometer. The test tubes, containing blood serum, are placed in this apparatus for about two hours daily for five consecutive days. The temperature must not be raised during this time to over 60° C. If at the end of that time we desire to use the gelatine as it stands in perpendicular tubes, we simply raise the heat very slowly to *not over* 75° C. or under 70°; the gelatine will then become solid; to be tested by shaking a tube a little.

We most frequently, however, desire to use both agar-agar and serum in tubes, with the gelatine offering all the surface possible to our use; to this purpose we must have an apparatus that will allow us to sterilize them both in an inclined position, but not such that the material in the tube will run up against the cotton plug.

The apparatus must also be a thermostat, for with the serum we have not much freedom in the temperature we can use.

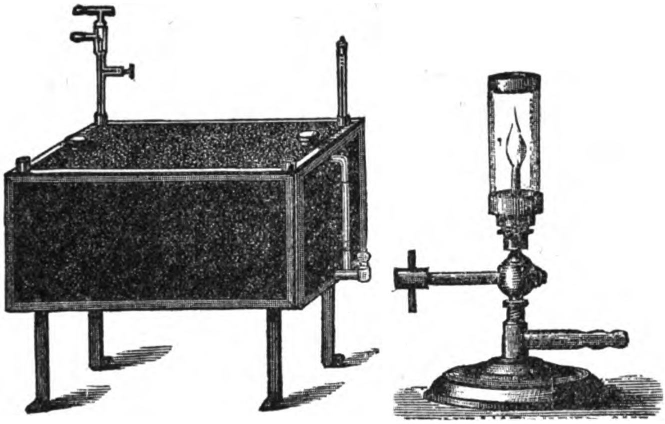
For this purpose we have the following apparatus made of block tin, with glass cover, double walled, covered with felt, and legs capable of raising or lowering on one end. It is supplied with thermometers, water gauges and stop-cocks, and is heated from underneath. A test-tube, filled with water or any fluid, should be used to test the incline we require for our tubes. In sterilizing the agar-agar little care is necessary about the heat. An hour a day for four or five days, and then leave the tubes to cool in the apparatus, which will hold one hundred 5-inch tubes, is all that is necessary.

With blood serum, however, all the previously mentioned precautions are necessary, and the same temperature must be adhered to.



As very many pathogenetic or questionable bacteria do not develop in ordinary room temperature, but in that of the animal body, it has been found necessary to make an apparatus by which we can for months or years keep up a constant degree of temperature at all times without it being subject to variations.

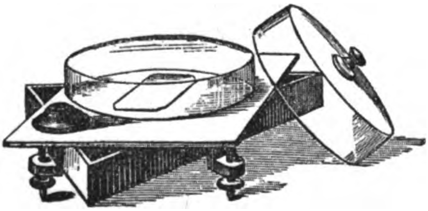
Such an apparatus is called a thermostat, and is made of block tin, double walled, supplied with gas and water gauges, thermometer, etc. It is covered with heavy German felt



This cut represents a thermostat 40 in. long, 15 in. high, and about 20 in. wide. The gas apparatus at the side is to heat it. It consumes but little.

There is one objection to these square thermostats as well as all round ones opening from the top. When necessary to open them the entire chamber is at once cooled off. This can be obviated in the round one if made of copper, by having it quite large and high, and internally divided with double water-holding partitions into three or four compartments each with its own door, each compartment should have its own thermometer, and I am convinced that we can get made such thermostats either round or square, made in compartments, each of which can be held at any desired temperature without influencing the others. Such an apparatus is necessary, and would do away with the necessity of having to have a different thermostat for every variety of warmth one desires; especially is this necessary when we desire to test the action of various grades of heat on the life of germs.

An ice chest is indispensable in such a laboratory.



The above cut represents a triangular oak frame, each arm being 12-in. long. It is arranged with screws, so that it can be made perfectly level. Upon this frame is a square piece of plate glass and underneath should be a dish holding chopped ice, so that the gelatine shall cool quickly. In the dish is to be seen the square of glass, upon which we pour the gelatine (it must never be allowed to run to the edge of plate)—see page 122, April number. The cover should lap over, not set inside, as some of these vessels have been made. By the use of glass bridges ‖══════════‖ made thus, and a little shorter than the glass plates. We can place five or six plate cultivators in one such vessel.

I have thus described every essential to bacteria cultivating, except the straining methods. For the latter I refer our readers to the manual by Friedlander, "Microscopic Technique," (D. Appleton & Co.) With what has been here detailed and Prof. Johne's paper, and the editorial of the last number in connection with Prof. Friedlander's book, any one who desires can, with time, patience and the necessary means, become an adept in bacteria culture.

ART. XIX.—PUBLIC ABATTOIRS A NECESSITY TO PUBLIC HEALTH.

There is no way of evading the fact that the consumer of articles of food, especially when of an animal nature, should be guaranteed by some competent and trustworthy authority, that the same are not only free from disease, but also free from disease-producing causes.

Every question which has to do with the public weal is of a necessity a political one, and any medical, or other journal, that interests itself in questions of this nature cannot help making them such.

The time will certainly come, when, nobody can tell, when every city will have its abattoir for the slaughter of all and every animal destined for human consumption, even though it be for use in the owners family, and when all such animals will be subjected to veterinary inspection both before and after slaughter. Every town should also have its slaughter-house, and there should be one to each district in the country parts of the State. Not an animal except poultry should be allowed to be slaughtered outside of such slaughter-houses. That every English and American city is far behind many on the continent in this regard, can be easily seen by visiting the Abattoirs at Paris, Berlin, Munich and other cities. These countries have not got the agricultural districts measured off yet. It will be readily seen that such measures are only applicable to thickly settled parts, and not where the farms are large and villages few and far between. Such persons must assume their own responsibility.

We have considered it more conformable to our purpose to offer to our readers the following very freely translated notes from Supt. Dr. Hertwig's report of the workings of the Berlin Abattoir, for the first year of its existence, than to make up a paper from our personal observations. We wish herewith to express our thanks, not only to the Superintendent, but to all his deputies for their universal politeness and kindness.

With the 1st of April, 1883, came into action the law making it obligatory that all animals destined for slaughter in and around Berlin, should be killed at one locality. It is evident that such a law rendered very great changes in the manner of doing business on the part of the butchers, yet it must be said to their credit that they have nearly all seen its benefits to themselves as well as the public. The number of animals slaughtered was: 93,387 cattle, 78,220 calves, 171,077 sheep, 244,343 swine. The number of butchers located at the works during the year was about 567. During the Winter months numerous private persons came to the works to slaughter their own swine. According to the nature of their calling, the butchers may be divided into three classes, viz.: wholesale, retail and contract butchers, or such as do work for others instead of buying animals on their own account.

All the flesh that is here produced is not destined for consumption in and around Berlin alone, much being sent into the interior of Germany, especially pork. From November to June there is a large export of mutton directly to Paris, special cars being built for the purpose, the track leading directly into the house. During the last year, 18,591 sheep were thus shipped to Paris. They are all stamped with a French stamp as if slaughtered in France, the people of Paris having still a strong antipathy to German things.

The days' work at the works is very well indicated by the following selections: One day's record, cattle, 743; calves, 484: sheep, 978; swine, 1,471.

Sundays, Mondays, Tuesdays and Thursdays are the busiest days, but little being done on Saturdays.

The inspection consists of a chief veterinary inspector and ten veterinary assistants; a book-keeper, four stampers or branders, a microscopist, and a veterinarian as supervisor of the meat inspection bureau; four sectional veterinary inspectors, eighty-seven sub-inspectors and thirty persons engaged in collecting specimens from the hogs as they are slaughtered. Each cattle slaughter-house has six veterinary inspectors who have also to do with the respective stables. There are four in the hog slaughter-house, and in the Winter months it is ncessary to increase the number. Ten extra inspectors have been arranged for on three days of the week. All animals are subjected to a most rigid examination both before and after slaughtering.

The diseases which have during the past year led to the condemnation of the entire animal, were: Tuberculosis 182 times, Hog Cholera 72 times,Icterus 38 times, Dropsy 18 times, Unhealthy Appearing Flesh 9 times, Badly Bled 3 times, Putrifaction beginning 1 time, Echinococci 1 time, Measles 1,621 times, Trichiniasis 216 times, Lime deposits in flesh of hogs 19 times, Actinomycosis in pork 15 times.

Single parts or organs were condemned in 21,229 cattle, 86 calves, 4,806 sheep, 7,401 swine. Tuberculosis was found in cattle 2,613 times, in calves 2 times, in swine 1,313 times, which led to the condemnation of 102 carcasses and 4,226 single organs in cattle, 2 calves, 78 swine and 1,940 organs of the latter.

The majority of these animals were more or less emaciated. Whenever the disease had acquired any considerable degree of generalization, the entire carcass is to be condemned. In the case of the calves there was a wonderfully generalized development of miliary tuberculosis of recent origin. In the cattle the "perlsucht" or serosa variety prevailed, while in swine pulmonary tuberculosis was most frequently seen. In cattle, tubercles were found three times in the flesh and single bones, while in swine none were found in the flesh but 56 times in the bones.

Where there has been no generalization of the disease, and where little or no emaciation exists, the flesh is allowed to be sold. (An interesting question is what becomes of the old, diseased, tuberculous cows in America? The poor eat them; drink their milk, and thereby help to hasten off their children. Not one comes to condemnation. I know of several butchers that make a practice of buying these and other diseased animals, and I know this meat is sold in the streets of Boston. The same may be true of every other American city.)

To continue the translation, microscopic examination of the tuberculous material demonstrated the characteristic bacilli to be present. They were also found in the milk from an udder in which there were tuberculor processes.

Dropsy and emaciation caused the condemnation of six cattle, five calves, five sheep and two hogs. In two of these cattle there was found most extensive disorganization of the lungs and liver, and once in cattle and hogs there was a large echinococcus invasion in the lungs; in two cattle and five sheep the livers were badly disorganized by distoma, and in one hog hydrops renalis was present to a great degree. To the diagnosis of Icterus it is necessary that the examination be made by daylight. In some regions the food leads to a yellow tinge to the flesh and fat of animals which cannot be mistaken for Icterus, when we take into consideration the condition of the skin, mucous membranes and other organs. In the case of five swine, the carcasses of which were condemned on account of the unpleasant appearance of the meat, although no disease was present, it is interesting to know that the animals had been fed on fish and oil-cake. The flesh had a peculiar fatty appearance, somewhat resembling smoked salmon, and had a very penetrating fishy smell.

In the revision of the cooling out rooms, there were condemned 81 cattle lungs, 167 sheep lungs, 20 livers from cattle and 64 from sheep, with 53 hearts from the latter, on account of beginning putrefaction. From other causes there were condemned 393 cattle lungs, 3 from calves, 78 from sheep and 805 from swine, and the livers from 291 cattle, 4 calves, 66 sheep and 50 hogs. Thread-worms—strong glids—were found in the lungs of 1,833 swine and 67 sheep.

On account of accumulation of blood in the tissues, 760 kilos of flesh were condemned during the year: 10,504 lungs and livers were condemned on account of echinococci invasion. The increase in size and weight of some of these organs was remarkable; for instance, while the normal liver of an ox weighs from 5 to 6 kilos and is about 35 centimeters long and 25 wide in one of these diseased organs the weight was 28 kilos, the length 75 centimeters, and width 50.

It is frequently stated that the distoma begin to leave the bodies of their hosts in the early Summer months and that the animals are free from these parasites during the real hot months, but examinations have shown that they are present at all times of the year. Abscesses were found in 1,279 lungs and 411 livers; 14,603 cows were found to be with calf in various stages of development; 1,621 swine were condemned on account of measles.

Most of these came from Poland. In some parts of the country it is the custom of the dealers to examine the swine for measles when they are destined for the Berlin market, hence it is that we do not often find them in such hogs. When only one cysticera is found in a swine, then the whole body is divided into the necessary sections, and the meat cut up for sausage purposes, but not hashed, under the supervision of an officer; if a second cysticera is not found then the flesh is not condemned. The carcasses of such animals are treated here on the grounds under police control, the lard is tried out and allowed to be sold, but the flesh and bones are made into phosphates for agricultural purposes. Aside from in the flesh we find the cysticera very frequently in the heart and brain, once in the eye, but not in the liver, lungs and kidneys; 216 hogs were condemned for trichinæ. They seem to be pretty equally divided among all breeds.

The diaphragm, its pillars; the tongue, abdominal muscles, intercostals and those of the larynx of 150 swine were subjected to the per cental observation of their numerical invasion with trichinæ. Ten pieces of each of these muscles, having a diameter of one quarter centimeter, making 9,000 specimens, were thus examined:

				Trichinæ.
In 1,220	specimens	from the muscles of	Diaphragm	987
" 1,400	"	"	Pillars "	1,329
" 1,370	"	"	Tongue. "	1,115
" 870	"	"	Abdominal muscle.	491
" 730	"	"	Intercostals.	308
" 1,220	"	"	Laryngial muscles:	710

Hence the pillars of the diaphragm are the most profusely invaded parts of the body, the intercostales the least. The latter fact shows their unfitness for trustworthy examinations. We thus thought to do away with this part of the examination, but the recent discovery of actinomycosis fungi in pork by Inspector Dunker, and the fact that these very muscles are the most profusely invaded by this new and dangerous parasite, renders it necessary that we still give these muscles our most exact attention.

The above-mentioned discovery was made in February, 1884, and during this month and March they were found in the flesh of fifteen swine. The result of these examinations is as follows: A peculiar irritated condition of the tissues—flesh—is to be observed from the presence of the fungi during all its phases of life. They frequently calcify, and their presence can only be made out by appropriate treatment with a diluted acid. Invaded spots of muscles show a shrinking or contraction of the primitive bundles, and granular degeneration of their substance. These changes gradually augment until such spots possess a dirty bronwnish color, and finally the irregular formed fungi becomes developed. These centres consist of a mycelium like staoma, consisting of very dense collections of fine threads which run in every direction, but as they approach the peripheries of the growth assume a more direct course and end in the usual pear-shaped protuberance characteristic of their fungi. The finer details of these fungi are not to be made out save with much circumspection. As soon as they have arrived at complete development they at once begin to calcify, whereby one may see them in a variety of forms which finally become enclosed in a sort of capsule composed of connective tissue.

The real place of these fungi in the natural kingdom has not yet been definitely determined, some authors classifying them with the rust fungi of grain and others with the mould fungi. Those holding the latter view look upon them as the conidia of such fungi which have, through some form of adaptation, acquired the ability to develop in animal tissues. Nothing is known of their manner of existence outside the animal organism, but the fact of their appearance in the mouth and adjacent parts makes it evident that they find the means of their introduction most probably in vegetable food. It is a very important question, how far the duties of a hygienic police have to do with these parasites in the food we eat, especially as we know that fungi of the same appearance occur in connection with a disease having the same name and nature in man. All hog meat, or other, is unquestionably condemned for this cause as an article of food.

The inspection of meat is done most thoroughly, there being a special building set apart for the microscopic examination of all meat, especially pork. There are 87 examiners in this building, and 30 persons are engaged in taking specimens from certain designated parts of the carcass of each animal. In the long months of Winter this number is insufficient, and extra examiners and specimen collectors have to be appointed. They are not appointed until after a most exacting examination, the most difficult and questionable objects being placed before them, and they must also serve a period of approbation before they can be definitely placed as examiners. A large number of these practising as microscopic examiners are women; the same proving a pleasant and paying task for them, they also make very competent inspectors.

Those employed to gather specimens from the slaughtered hogs take 24 specimens from each hog, viz., 6 from the muscles of the diaphragm, 6 from its pillars, 6 from the muscles of the larynx, 6 from the abdominal muscles, each set of 6 specimens are collected in a small tin box with the name of the section of the body stamped in the cover. Large specimens from these are then cut off and placed in order between two heavy glass plates some eight inches long and half inch thick, and are then pressed out very thin by screws which draw the plates together; they can then all be examined at once. These glass plates are divided into sections and numbered; numbers 1 to 6 for the specimens of the diaphragm, etc. Specimens which appear at all doubtful are at once brought to the attention of the chief inspector.

Special instruction upon meat inspection is given to the examiners by Dr. Dunker when it seems necessary.

ART. XX.—RUDOLF VIRCHOW.

Virchow was born on the 13th of October, 1821, at Schivelbein, Pommerania, and studied medicine at the University of Berlin, graduating in the year 1843. He at once became Prosector at the Charité. Here began his scientific work, which was at first largely done in connection with his friend Reinhart, with whom he started the world-renowned "Archiv." In 1852 Reinhardt died, since when the "Archiv" has been conducted by Virchow alone, the 100th volume having recently been issued. In the first volumes may be found the work upon which his great reputation mostly depends, for the nuclei of the cellular pathology first appeared as original articles in the JOURNAL, and he who would really understand the true nature of Virchow's work and value his teachings correctly must turn to the Archiv more than to the bound volumes. Here will be found the best criticism of the great French school founded by Bichet, and carried to completion by Laennec, Dupeyton and others, and introduced into Germany by that master of descriptive pathological anatomy, Rokitansky. It is not the purpose of this article to notice all the literary works of Virchow's, but it is to be principally found in the above-mentioned "Archiv," the "Special Pathology, or Encyclopædia," which bears his name as editor, and the three volumes of "Collected Writings," two of which have been recently given to the world. A work which, however, deserves especial mention was a short-lived periodical that bore the name of "Medical Reform," published in connection with Leubuscher in 1848-9. The "Cellular Pathology" has been through numerous editions and published in more languages than any medical book that has ever been written. In connection with it should be mentioned the work upon pathological tumors that still remains, and probably will, uncompleted.

Who shall review the character of Rudolf Virchow? When the history of this century comes to be written and each great man's work critically considered, there will be the names of three men that will tower so far above all others that the lesser and more local lights will be almost lost sight of. These names will be Rudolf Virchow, Charles Darwin and Bismarck. I place them in this order, for it represents to my mind that in which they will rank as benefactors of humanity. Virchow and Darwin have lived for all humanity. Bismarck, for his "liebe Deutschland," but without him German science and human knowledge would not have occupied the advanced position it now does in the world. While Bismarck is the autocrat and often mis-called despot of Germany, he has made of his country the crucible out of which the bonds of the human intellect have found new freedom at the hands of others.

But I am not writing of Bismarck, but of his great political opponent, Virchow. Perhaps my good friend and teacher may object to the comparison, but if Bismarck is the autocrat of Germany, the great pathologist is no less the autocrat in his position and laboratory. Wherever man suffers, wherever death exists, wherever an intelligent medical fraternity treat the ailments of man, Virchow has built a monument as enduring as the intellectual activity of the human race.

Virchow is the humanitarian of German politics. He simply lives beyond his time. Germany is not yet fitted to make practical the ideas of Virchow, but the German has advanced to a better understanding of his manhood through the work of Virchow and the party of progress to which he bebelongs. Without the unity established by Bismarck, the liberty desired by Virchow and others would be much further from future accomplishment than it is at present.

Virchow began his rebellion against existing things very early in his professional career, even before his appointment to a professorship, for in 1849 he was removed from his position by the Ministry "for political reasons,"—a lucky thing for medicine and humanity—and called to Wurzburg, where some of his best work was done.

Now, mark the difference between a republic and the *then despotic*, but still intelligent, monarchy. Virchow had made his name, and the world was beginning to find out that truth had found a new apostle that had stirred the healing waters in the pool of medical stagnation at Wurzburg. If the sick, the lame and the blind did not go there to await the stirring of the waters, those who were to become their medical attendants did, and it is sure that "never man spake" as this new apostle spoke, and never did truths more needed fall upon willing ears, or become fixed in more earnest minds, who, like the apostles of old, went forth from this little German town to spread the glad tidings of *what disease is* over the world. Could such a man be neglected? His politics had not changed; his future has shown us that he was ready to do and dare, do for the good of humanity, whether in facing disease in his daily laboratory work, or studying epidemics wherever sent, or in opposing the government in favor of more liberty in the halls of the German Reichstag, or at the political meetings in Berlin. The masses, those who feel they are down, and want to get up, but do not know how, had as good and true a champion, the government as bitter and obstinate an opponent in 1856 as they have to-day.

Did that have any influence on that government? No! The man best fitted for special work always finds recognition in Germany, no matter what his politics, and does not fear losing his place, no matter how many changes there may be in administrations.

Virchow was called again to Berlin, and received the Professorship of Pathology at the University.

What need have I to say more? And yet a few words may not be out of place by one who knows the master well, and who, even though absent, still sits at his feet.

In person Virchow is of medium height and rather inclined to spareness. In physique, but few men can compare with him in ability to do protracted work; even at his time of life, there are few young men that could hold out and work with him for a succession of days. He is, what one would expect, a simple, straightforward man, and as I have said, an autocrat to those who come in professional connection with him. "Knowledge is power," and it is but doing justice to the man to whom we all owe so much to say that he knows his power and makes you feel it. Still, like every other German, even to Bismarck, of whom very many years in Germany have made it necessary at times to ask favors, Virchow has been to every one who wanted to learn, kindness itself, and even though driven with the almost innumerable calls upon him, I have never seen the time that I was refused, or that I could not obtain all the personal instruction I desired.

Virchow is not eloquent, but logical, profound and clear. He is not only the best analytical pathological anatomist the world has as yet produced, but also the first of the profession that can truly be called a medical philosopher.

Virchow is a skeptic, and hence will be found continally weighing the evidence. He by no means accepts all the new things that have come up, and yet utters no senseless condemnation, as is too often the case with those who have grown old in the ranks. Though his body has aged, his intellect retains all the freshness and vigor of youth.

He is not the person for the ordinary student to study under, or for one to hear who does not thoroughly understand the language, as well as being already up in patho-anatomy. He is too philosophical for such, but to one who is himself a student the master is the teacher *par excellence.*

ART. XXI.—THE HISTORY OF TUBERCULOSIS.

BY DR. ALBERT JOHNE.

[Continued from page 188.]

What consequence does the proof of the identity and infectiousness of Tuberculosis in man and animals have for the medical and veterinary police?

When we take into consideration the proven possibility of the transmission of tuberculosis to human beings through the consumption of flesh and milk from tuberculous animals, we see at once that Gerlach has clearly indicated the task of the veterinary police. The government must forbid the sale of flesh, even as much as they should the milk from such animals.

That such a procedure is justifiable has been still more strongly proven by the more recent researches in this direction. Fear of the consequences seems to have been the cause of the greatest reticence, as well as prudence in the consideration of these questions. From the practical stand-point no one has yet gone to the extent demanded by Gerlach in the execution of laws for the regulation of the sale and disposal of such food.

It is doubtful if the veterinary police have given the attention to this question which its public importance demands. Statistics in this direction are decidedly wanting in all parts of Germany, with the exception of Bavaria. The governments of Swabia and Neuburg, through the influence of the Veterinary Association, have made regulations requiring all official veterinary inspectors to gather statistics with reference to every case of tuberculosis, or perlzucht in cattle in their respective districts, and also such observations with reference to the injuriousness of the flesh or milk from such animals as they may come across. They have also to notify the doctors of such districts of the families where such cattle are found, especially milk cows, in order that they may assist in such observations. The position which the medical police at present assume towards the question of the use of the flesh of tuberculous cattle is as follows: Such meat must be classed among those articles which are considered as injurious to the public health as food. The exact execution of laws of this nature would have a most deleterious effect upon the owners of marketable animals. Experience has shown that cattle having tubercular processes in various organs can still be in good condition for market, and yield a first-class (*looking*) article of food at the shambles; this is especially the case when the complications are almost entirely limited to the serous membranes. When the tuberculous masses are removed from these membranes it frequently happens that the balance of the carcass presents an entirely blameless appearance. The question is:

Shall such meat be inconsiderately thrown away? Where shall the limits be drawn between what is suitable and non-suitable for human food?

To properly answer these questions is a matter requiring the greatest circumspection. Semmer concludes "that the perlzucht and tuberculosis are either uninjurious as human food, and then all can be eaten, or it is injurious, in which case the sale of such material should be absolutely forbidden," (but he leaves the government experts to decide which.)

Gerlach does not put it quite so strongly, but strong enough, however, to decidedly interfere with the agriculturists and breeders.

According to him the disease must be assumed to have become constitutional, *i. e.*, generally when the animals begin to fail in condition when dietetic causes are unknown. The animals are then to be considered unfit for the shambles, hence, unfit for human food.

1st. When the lymph, glands in the vicinity of the tuberculous diseased organs have become infected, thus rendering possible the extension of the disease over the organism by way of the lymph circulation. When the lymph glands are not effected the processes of the disease still remain localized. When a number of lymph glands have become affected the entire lymphatic system may be suspected.

2. When cheesy-degeneration has begun in the lungs or elsewhere, the more cheesy-tubercles, the more dangerous the flesh is to be considered.

3. When emaciation has begun.

4. When a general tuberculosis can be diagnosticated.

It has been objected that Gerlach's requirements extend far beyond the grade of actual necessity, as in many cases finely-conditioned animals would have to be withdrawn from the market were they to be resorted to.

The question, however, in reality, is not of so unfavorable a nature as Gerlach and some others would have us believe. There is no question as to the infectiousness of tuberculosis. That it is a disease which is produced by specific virus capable of producing tubercles in any tissue with which it comes in contact. Cohnheim has shown the manner in which this virus extends over the organism through natural channels, partly along the inner surface of canals having a mucous lining, partly through the lymph glands and ducts, or from the intestines through the radicles of the portal circulation. His and other investigations have further shown that this virus can gain access to the circulation either from a primary or secondarily diseased organ, and thereby carried to all parts of the system, causing a generalization of the disease per metastosis. If this is but seldom the way, the reason, according to Cohnheim, is to be sought in the fact that the quantity of virus thus circulating is too small to be effective.

On account of the results of Koch's investigations we must conclude, also that small quantities would be much more likely to be removed from the organism by means of the excretory organs before they had time to develop their activities. On the contrary, generalization would be likely to occur in instances when large quantities of the virus are rapidly added to the blood. It has already been mentioned that the thoracic duct and pulmonary veins form the two great supply items to the circulation in this direction.

Other authorities have called attention to the fact that such general infection occurs all the more readily the more the tuberculous processes have undergone cessation, and become softened. Consequently, when the tuberculous processes have a prevailing fibroid character, or calcify quickly, or are formed in a firm stromo, the less liability there is to generalization, *i. e.*, organization of the virus.

These assertions have been fully confirmed by clinical observations. From the above it is to be seen that we can only speak of infection of the blood, when the phenomena indicate that generalization of the disease has occurred, *i. e.*, when aside from primary and secondarily diseased centres, others are present, have no direct connection with them, and which could only have become infected through the mediation of the circulation.

What are the conditions in the muscles, *i. e.*, the flesh we eat? In what way can they become infected?

The anatomy gives the answer. Only through the blood. Neither of the lymph systems of the breast, abdomen or pelvic organs, nor those of the serus membranes of these cavities have their course in the great muscle-groups, and therefore cannot convey infection to them, except to an infinitesimal degree in some small localities, as the intercostales.

The question at what period in the disease is the flesh of tuberculous animals to be looked upon as infected, and hence itself to be considered as infected also, does not depend, as Gerlach has asserted, upon the complication of appositional lymph-glands, but rather on the proof that actual generalization of the disease has taken place. When this has occurred such flesh must be unconditionally shut off from sale and consumption.

It is also an erroneous conclusion to assume that approaching emaciation is conclusive evidence of the extension of the tuberculous processes to the flesh, the latter only occurring when the disease has acquired the most extensive and destructive conditions in other and more important parts. It is well known that when the lungs, liver and intestines become the seat of tuberculous processes that marasimus soon sets in, without generalization, of necessity, having taken place. On the contrary, animals may have tuberculosis of the serosæ of a more or less extensive character for years and still continue in fair condition and be capable of being fattened, unless the disease extended to the important organs, and per metatosis, to other parts of the body. Therefore, there can be no generalization of the tuberculosis in a given animal when the virus has not gained access to the circulation, hence the flesh must be free.

The milk from tuberculous animals is to be considered as possessing an unquestionable infectious character. It must be the duty of the police to put a stop to the reckless usage of such milk to many babes. When the animals are known to have tuberculosis of the udder, the milk is to be at once destroyed.

Auscultation and prevention do not, even in extreme grades of tuberculosis, always give us trustworthy evidences of its nature.

Tubercular conglomerations of considerable size upon the pleura may escape recognition on account of the marked degree of resonans possessed by the thorax of cattle. The peculiar friction, noises, crepitus of this disease can only be heard when the plural tubercles have undergone calcification and their surface becomes more or less rough in consequence. Nymphomania, sterility and abortion, without visible cause in connection with approaching marasmus, are often connected with this disease, and have symptomatic value. These anomalies are only present when the tubercle deposits are principally situated in the peritonal regions, especially in the vicinity of the sexual organs. When the uterus is complicated a muco-purulent discharge often issues from the vagina. The axilliary inguinal and other accessible lymph-glands are often to be found in a hypertrophied condition. Diarrhœa of a chronic type is sometimes present. In young steers orchitis sometimes appears, apparently without cause. When the udder is affected we can frequently feel its lymphatics and nodules and cords, as well as indurated conditions of the glands. These, with chronic cough, nymphomania, etc., are sufficient to confirm the diagnosis.

Koch's methods of tuition for the diagnosis of tubercle bacilli have not as yet been accurately applied to the milk and discharge from tuberculous cows, hence their value as a means to diagnosis is yet to be decided. Intra ocular inoculations with the milk of suspected cows have not yet been, but should be, resorted to as an aid to diagnosis.

The so-called Milk Cures should be subjected to the most exact veterinary inspection, as well as milk farms supplying the cities, especially those places having few cows, which are kept in the suburbs and supply the poor in their immediate vicinity. The poor are generally the sufferers from dangerous and inferior articles of food.

It will be seen that veterinary police inspection, in order to gather statistics at markets, make practical observations over the transmissability and infectiousness of the disease in herds, also, in connection with the M.D., to watch results in families, to control the dairies, etc., is an absolute necessity in every country, and that every government which does not organize such a system is most emphatically not one for the people in any sense of the word.

THE MANNER OF INFECTION IN TUBERCULOSIS.

Tuberculosis can be either acquired or hereditary; it can even be transmitted to the ovulum of the female by the generative act, or the primarily healthy embryo may become infected from the mother.

Although *intra*-uterine infection has been generally denied or doubted for human tuberculosis, it has been proven to occur, by undoubted observations, in tuberculosis in cattle and swine. It has been frequently observed in young animals of five or six weeks old; especially has this been the case in unborn or aborted fœti.

Chauveau, Konig, Eberhardt, and many others, have all given examples of intra-uterine tuberculosis in animals. The Bavarian veterinary reports are especially rich in such examples in both cattle and hogs.

EXTRA-UTERINE INFECTION.

It is possible that the born animal can be infected.

We must hold to the fact that tuberculosis can be acquired through the digestive tract, from the consumption of the milk or flesh from infected animals.

It has been sufficiently proved that calves can be infected through the milk of tuberculous mothers. That the milk from cows, in which the udder is the seat of tubercular infiltration, contains a specific virus. These things have been proved by experiment and microscopical examination.

Gerlach declares that the infection of calves in this way is next to heredity, the most important etiological moment. Zippelius reports a fatal case of diarrhœa, in a calf with large tuberculous ulcerations in the intestines and tuberculosis of the viceral peritoneum; the mother of the calf was slaughtered on account of the disease, which she had in a very severe form. Aufrech found the liver of a thirty-seven-days-old rabbit to be the seat of an extensive miliary tuberculosis, the mother of which was inoculated with virulent material a day after it gave birth to young. Others have reported similar results.

Such milk has also caused tuberculosis in swine fed upon it, and is especially prevalent in North German swine, where tuberculosis is also most frequently met with in cows. Observations have been resorted to where whole families of swine, held at dairies and cheese factories, have gradually perished from this cause. Frequently the disease seems to have appeared in the cattle and swine of the same form. As we have fully stated previously, the flesh of tuberculous cattle can produce the disease in other animals. In this consideration swine come chiefly into this catagory. Such flesh has been too frequently looked upon as a cheap variety of food for swine. If the sputum from such cattle has or can infect neighboring cows, or if the food becomes polluted with it, is still an open question.

Infection of healthy animals can take place through the inspired air through cohabitation, *i. e.*, through living with diseased animals.

This assertion has been so fully proved by the experiments of various authors, as to leave little doubt.

The assumption that the cohabitation of healthy and tuberculous cattle can cause the infection of the former, is becoming more and more confirmed since practical observation has been drawn to the subject.*

When such is the case in a herd the disease can only be eradicated by unconditionally slaughtering all the animals, and the thorough cleansing and disinfection of the stables before new ones are introduced.

The manner, or media, by which infection occurs in such cases, has not been settled.

EXTRA-UTERINE INFECTION BY COITUS.

This is not doubted for human beings, and its possibility is to be assumed for animals, as uro-genital tuberculosis is by no means an uncommon occurrence in cows.

The predisposition to tuberculosis in individuals of certain descent is a factum of great etiological importance, and must not be neglected in the consideration of this question. As in man so in cattle we can assume the existence of local weaknesses, or an abnormal condition of certain tissues which especially favor the penetration and action of tuberculous virus.

Such abnormal conditions can be either inherited or acquired, and be either rare or individual peculiarities.

Favoring such conditions have been suspected:

(*a.*) Too much feeding with swill foods and brewery refuse.

(*b.*) Continued confinement in poor, illy-ventilated, hot and moist stables, in which the animals are too-closely packed, and not allowed exercise.

Zippelius calls attention to the fact that tuberculosis is most frequently met with in cattle kept in deep valleys, and in such stables as described above.

*** See original for cases, also the Translator's Book on Animal Diseases and Public Health for examples.**

(*c.*) Forcing the cattle both in milk and calf production must necessarily produce debility and a tendency to this and other complications.

To the proper stamping out of this disease, the following regulations recommend themselves:

(*a.*) All tuberculous or animals with tubercular or tendencies to pulmonary diseases, must be unconditionally excluded from breeding.

(*b.*) All animals diseased with tuberculosis, must be unconditionally separated from healthy ones, and immediately slaughtered. Suspected ones should be treated in the same manner.

(*c.*) Stables in which such animals have been kept, must be thoroughly cleansed and disinfected.

(*d.*) All momenta tending to produce a predisposition to disease, must be carefully avoided, and great care given to ventilation, diet, exercise, exposure, etc.

EDITORIAL DEPARTMENT.

SPAYING BITCHES.

Of this useful operation a certain English veterinary author* says: "Spaying, or removal of the ovaries of the bitch, is now almost unheard of, and I trust the time is not far distant when it will be discontinued on other animals. The operation is both inhuman and useless; I am thankful to say that I have never seen it performed in canine practice, and will, therefore, quote from another authority, Youatt." Hill then quotes from Youatt, who recommended that senseless operation by the flanks.

The only way to perform this operation is with ether, and by the median line. There is absolutely no danger in it; of 400 bitches of all ages, I have never lost one from the operation, and only one from the careless application of chloroform by an assistant, which caused me to have recourse to ether.

The operation is human and useful in that if made obligatory by law, except to breeders, in a special license, it will tend to decrease the number of dogs, especially useless curs. and thus lead also to a diminution of the chances of hydrophobia in man. There is a continual complaint among the farmers of the Eastern States "that they cannot raise sheep because of the damages done by dogs." Now the question is, What kind of dogs? cur dogs, that are raised at every hut and every cluster of houses at cross-roads through the country. Such people keep a dog, for what purpose nobody knows. A bitch is as good as any other, for to them a dog is a dog regardless of sex. It comes in heat;. all the dogs of the neighborhood cluster round, snapping, snarling, and biting, and if one be rabid, may lead to the injury not only of people but of domestic animals.

If the law demanded that all bitches should be spayed, and that the operation should be certified to in regular form by the operator, who should be a veterinarian, and then place the license of such spayed bitches at the same price as male dogs, and for unspayed bitches demand a license of $25—a breeder's license—the effect would be to lessen the number of curs in the country and increase that of valuable dogs which owners would look after. It may be said that this is unjust to the poor man, but it is not. If he wants a bitch he would then keep a good one, the young of which would in any year more than pay for the license.

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* **Woodruff Hill, "The Management and Diseases of the Dog."**

Hill again says: "Breeding is a necessary process, and females prevented from it are sure to be affected with disease sooner or later."

That is downright false, and betrays an ignorance of the true conditions, only to be compared with the rest of his book on dogs. A spayed bitch is not to be compared to a castrated male, in any sense of the word. A spayed bitch is simply a natural one for ten months and a half of the year at least. She is just the same as when not in heat. She does not lie round, or accumulate fat, as the male dog does. She is the only decent house dog, and is absolutely free from the disgusting exposures and habits of the male dog. A spayed bitch is the only decent dog for a ladies' companion. A spayed bitch does not attract the filthy attentions of male dogs, even as much as other males, nor are they continually disgusting one by polluting every lamp-post and house corner, when one goes out for a quiet walk. They are not so liable to obesity and disease as other dogs, all authorities to the contrary notwithstanding.

Every government that has any interest in the welfare of humanity or agriculture, should compel the enforcement of these regulations. B.

THE MEDICAL DIPLOMA CRAZE.

In the June issue of the *American Veterinary Review* is a paper by our colleague, Prof. Liautard, upon this subject, which is worthy of attention. It would seem as if many of the younger men in the profession had gone mad in their desire to hide their regular calling under the, to them, more resonant title of "medical doctor."

The title one has is simply the announcement to the public that one is, or should be, capable of offering it the services of an educated professional. The more we complicate this title by adding on a whole alphabet of letters, which are entirely meaningless to the public, the more we detract from the dignified position that we should assume.

How many Americans know what F.R.C.V.S., or what is still worse, H.F.R.C.V.S. means?

We are beginning to demand that the law take some recognition of our profession, but if our legislators are to face this babel of titles they will certainly be a long time before they tell who is a Veterinarian, and who not.

The M.D. attached to a Veterinarian's name is neither worth the money, or time or study it takes to obtain it. The regular medical profession looks upon such a person as an interloper, who is ever willing to step outside his profession to make a dollar and the public think him an M.D., who, not being successful in practice, becomes a "horse doctor," because he was not fit for anything else.

It required no such addition to his name to enable Bouley to become President of the Society in France, a position in the highest degree honorable. Gerlach, Leisering, Roell, Toussaint, Chauvaeux, Dick, Percivall, and others have needed no M.D. to lift them into the heaven of immortals. Let our work tell what we are, and if in the course of time it is of such value to the world that some noted university gives us the honorary title of M.D., as has been the case in Europe, then we have indeed earned it, but the M.D. of an American medical school is of far less value to us Veterinarians than our own honestly won diplomas, because we must first ask how it was got and from what school it was obtained, before we are sure it is a sign of any increased educational ability.

If Veterinarians desire to complete their education in the very things they most lack, as we stated in our last editorial let them attend some of the post graduate schools, where they can get all they need—but no humbug-giving diplomas—in a more practical form and at less expense than at any medical school. Let us be honest and stand on our own feet and not try to fly with borrowed wings.

There should be a convention of delegates from all these schools, and one title—Doctor of Veterinary Medicine—adopted by all. B.

EDITORIAL NOTES.

New York Polyclinic School of Medicine.—The pathological laboratory of this institution having been fitted up at great expense, we feel it a pleasure to be able to announce to our colleagues that the Faculty have consented to Dr. Billings forming special classes of Veterinarians, or taking private students in courses of Morbid Histology. Is is scarcely necessary to say that every endeavor will be made by Dr. Billings to further the studies and desires of Veterinarians in this matter.
C.

American Veterinary College.—We are pleased to inform our readers that Dr. Billings has made such arrangement with Dr. Liautard that he will be enabled to give a continued series of lectures each week during the coming winter and spring courses in general pathology and demonstrative pathological anatomy. Autopsies at the school will be conducted by Dr. Billings upon every animal dying at the hospital. C.

Correction.—We desire to correct a typographical error making the author of the interesting article on "Azotura," published in our last Journal Thomas W. Rogers, instead of Thomas Balffe Rogers, of Westville, N. J. We are pleased to state that Dr. Rogers promises us an article on the diseases of the intestinal canal, to appear in the next number.

CASE DEPARTMENT.

I.—AUTOPSIES AT CENTRAL PARK MENAGERIE.

Axis Deer (*cervus axis Erxl*), Weight 75 pounds.—Made two days after death. Body already skinned, decapitated and without limbs. Owing to the objections raised by the osteologist of the institution against the skull being properly opened the brain could not be examined.

Heart.—Weighed eight ounces; thickness of wall of left ventricle one inch, that of right ventricle, three-eighths of an inch; all the cavities were filled with dark red and whitish clots, which also extended into the large vessels immediately adjoining the organ; its color was of a dark brownish red.

Lungs and Pleura —Parietal layers of pleura adhering firmly to chest walls; upper lobe of left lung decidedly emphysimatous and cavernous, of a light brown anaemic appearance; lower lobe of a dark brownish-red color, easily broken and friable; blood vessels overdistended with blackish blood, a mixture of frothy mucous and blood oozing out from the cut surfaces; tuberculous; miliary tubercle also found over pleural surfaces. Right lung in same condition. Weight, left, eight ounces; right, twelve and a-half ounces.

Spleen.—Length, six and a-half inches; breadth, three inches; thickness, three-quarter inch; surface, steel gray; pulp, brownish-red in color, weighed two ounces six drachms.

Kidneys.—Capsules easily removed, surface of a steel gray color; parenchyma of a brownish-red color; otherwise normal in appearance; right weighed one ounce seven drachms; left, two ounces.

Liver.—Strongly adherent to diaphragm ; weighed one and a-half pounds ; longest diameter, ten and a-half inches ; short diameter, six ounces; thickness, two and a-half inches ; of a normal dark brownish red color.

Intestines.—Both rumen and reticulam partially filled with boluses of undigested vegetables, showing marked signs of engorgement; vessels, prominent and ingested ; all the rest of the intestinal canal was, throughout, covered with flakes of recent lymph and the great omentum and the mesenteries adhered together and to the abdominal parietes ; it was due to this that the length of the canal could not be accurately determined. Miliary tubercles found on omentum and mesenteries. On about the centre of the great omentum a small cyst was discovered, of the size of a pigeon's egg, and of a yellowish, perfectly transparent color, with semi-fluid, gelatinous contents adhering to the omentum by a short pedicle. All the viscera showed well-marked signs of congestion and recent inflammation.

Bladder.—Contracted in pelvis and normal.

Cause of death.—Tuberculosis; immediate cause, tuberculor peritonitis.

H. G. Beyer, M.D., U. S. Navy.

Dorcas Gazelle (*Kobus gazella dorcas*).—Had convulsions April 18th, 1885, in one of which it died; supposed to have been brought on by indigestion. Head, extremities and skin of trunk had been removed. Decomposition somewhat advanced: larynx contained two large blood clots, each about two inches long and several lines in diameter, one extremity of one of which protruded from glottis; source of hæmorrhage not apparent. Lungs showed small extravasations. Heart contained soft dark clots. Rumen filled with three pounds of oats and hay undigested. Gall-bladder empty; spleen seemed shrunken; small intestines empty; large intestines contained some flatus; cortical substance of kidneys very dark. Cause of death probably asphyxia from closure of the glottis by blood-clot.

F. W. TRUE, Curator, U. S. Museum.

Water Buck (*Kobus ellipsiprymnus.*)—Decomposition well advanced; mucous membrane of larynx and trachea nearly black; pleuro-pericardium and peritoneum contained much bloody serum; lungs, collapsed; heart, flabby, full of black blood and clots; œsophagus and rumen distended with undigested food; intestines, empty; greater omentum, lower free margin, showed a cyst containing a vesicular entozoon, two inches long, with head flattened laterally and single central mouth; not yet identified. Some bile in the gall-bladder. Cause of death not clear, probably over-distension of stomach.

F. W. TRUE, Curator, U. S. Museum.

II.—SOME DISEASES OF THE OURANG-OUTANG.*

BY PROF. R. BASSI.

Acute Intestinal Catarrh.—Case 1. A male ourang-outang, aged about five years, that had been imported to Italy about a year and a-half previous, was placed in the Zoölogical Gardens of Turin. This animal, while in the hands of its former owner, had suffered from a severe illness, of the nature of which I hvae not been able to obtain exact information, and in consequence of this disease it had lost all its hair, but had entirely recovered from the attack, and afterwards increased in flesh. For about two months after its entrance into the Garden, with the exception of four days, during which he was attacked with rheumatic fever of moderate intensity, the animal was quite well. Then he presented *l'herpes labialis* of the identical form as that which is not so rarely observed in the human species after accession of intermittant fever. After this time the animal appeared weak and melancholy. It had intense fever, frequent discharges from the bowels, copious and liquid, of a yellowish color. These discharges occurred sometimes with manifest signs of tenesmus. The acute intestinal catarrh was aggravated progressively until the death of the animal, which took place eight days after the attack. During the last two days of his life he had become so emaciated and so weak that with difficulty he moved on his bed. All through his sickness the animal drank nothing more than a little broth and ate only some pieces of musk melon. The only thing he appeared to enjoy was a little lemonade. This disease was caused by a lowering of the temperature of the atmosphere. I had not the opportunity of making an autopsy.

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* From "Il Medico Veterinario.

Case 2. Another ourang-outang, female, was attacked by the same disease. She had frequent discharges from the bowels of a yellowish color, great thirst, no appetite, convulsive movements of the lips and intense fever. I administered simple syrup with a few drops of laudanum during the day. No benefit was derived from this remedy, and the diarrhœa continued nineteen days, at which time the animal died. No autopsy was made.

Tuberculosis.—We received from Marseilles an ourang-outang, female, not quite four years old. The animal was in good condition, active, and did not appear to suffer from the journey to the garden, although made in winter, but she coughed occasionally. Early in the spring the animal commenced to lose appetite and to be capricious in the choice of her food. At times she had fever and a dry cough. This state of things continued, with alternations of improvement and relapse for about a month, after which she refused all food until relieved by death. An autopsy was made fifteen hours after death. Animal was well nourished, and the flesh, in color and consistency, similar to that of a chicken. The fat was in great layers, as in the pachyderm, and there appeared also other large masses around the kidneys, spleen, among the folds of the mesentery and of the large omentum. The digestive tube was very pallid along its whole length and distended by gas. Fatty degeneration of the liver existed and there was tuberculosis of both kidneys, but the tubercles were few and small. Large tubercles were found in the spleen, but they existed more abundantly in the lungs, where there was also found serious hepatization, especially in the right one. Tubercles were not softened in any of the organs. The spleen was adherent to the diaphragm. The animal, when purchased certainly had tuberculosis, but there was no indication of it. It would have lived, perhaps, for several months longer, if it was not for an attack of pneumonia, caused probably by some sudden and marked change in the temperature. Some pieces of the intestines invaded by tuberculosis served to practice inoculation in six India swine and a peccary. Inoculation was successful in some of the swine and not in the peccary. Three months after inoculation the swine were killed and the lungs and spleen were found largely invaded by tubercles.

Paroxysm of an epileptic form.—A female ourang-outang, which appeared quite well suddenly broke from its keeper, worked in convulsions, gnashed her teeth and foamed at the mouth. This lasted a few moments and the animal in a short time was restored to its usual vivacity. Nothing further was observed by the keeper for another week, when similar symptoms again appeared. Informed of the fact, I carefully examined the animal, and found nothing abnormal, except the tongue was somewhat sore at the apex, which was evidently caused by a bite during the convulsion. Not having succeeded in finding out what caused the epileptic attack, I applied remedies in accordance with the symptoms—hydrate of chloral, after which the epileptic fit did not occur.

CORRESPONDENCE.

ROYAL VETERINARY COLLEGE,
EDINBURGH, May 29, 1885.

To the Editors of the JOURNAL OF COMPARATIVE MEDICINE AND SURGERY:

GENTLEMEN—In perusing the various articles contained in your very excellent April number, there are two that have particularly attracted my attention.

The first is the paper on "Tuberculosis," by my friend Professor Bang, a copy of which, in the Danish language, he was good enough to forward to me; but not being acquainted with the Danish tongue, I was reluctantly compelled to lay it aside—and it is a paper possessing a special interest to me, for the simple reason that I have taken up a rather definite position in connection with the subject of milk contamination by tuberculous cows. While I cannot agree with all the conclusions arrived at by Prof. Bang, I must, nevertheless, bear my individual testimony to the great interest and value possessed by his paper and the experiments he therein records. The position I have personally taken up in connection with milk contamination is, "that there can be no contamination of milk by the tubercle virus without local (mammary) lesions." If the virus of this disease was conveyed from point to point by the blood stream, instead of, as we know to be the case, by the lymph stream, one could understand that the milk could become virulent in a tuberculosis localized in the lungs, liver, or any other organ; not only so, the saliva, the urine and other secretions would become virulent also. In making this remark, I do not, of course, lose sight of the fact that we occasionally meet with cases of *general infective tuberculosis;* but these are comparatively rare, only result from the involvement of blood-vessels (as in the lungs), and when existent produce such an effect upon the system as, practically to arrest the function of such secerning gland as the udder.

The conclusions arrived at by Prof Bang are largely dependent upon the assumption that he is enabled in all cases to diagnose positively the existence during life of tubercular mammitis. I confess that I do not pretend to be able to make such diagnoses with accuracy. I have met with cases of induration of the udder, which presented no characteristic differing from those of tubercular induration, and in which the animal has not shown the slightest indication of being affected with tuberculosis, either in her general condition or in her parental history, and in which a cure has been readily established by the adoption of appropriate therapeutical measures; at the same time I am free to acknowledge that cases occasionally come under observation in which, by the aid of collateral evidence, *e. g.*, the animal's general condition, her previous history, the existence of nymphomania or enlarged lymphatic glands, one is enabled to give a positive opinion anent the character of the mammary lesion.

Since writing the "Four Bovine Scourges," to which Prof. Bang alludes, I have met with a greater proportion of cases of tubercular mastitis than I had seen previous to the date of its publication, and some of these cases have occurred in Danish cows; but in every instance the udder lesions *have been* *secondary*, and I cannot conceive the possibility of a local, primary contamination of the mammary gland from any source other than direct or indirect inoculation, seeing that each lacteal orifice is guarded by a powerful sphincter.

I am quite prepared to grant that the results of properly conducted experiments are more conclusive than are theories, no matter how good may be the basis upon which the latter are founded; but, notwithstanding this acknowledgment, I cannot divest my mind of the idea that, in the cases of successful infection by milk from animals in whose udders there were apparently no tubercular lesions, there must have been local, mammary lesions which had escaped observation. Whichever view may ultimately be found to be the correct one, on one point all who are interested in the question of the relation of the infective diseases of animals to those of man will agree with me when I say that the paper, published in your JOURNAL, by Prof. Bang, possesses the very highest merit, and should be of the greatest possible value to those who are engaged in the study of this important subject.

The second paper which has interested me is that by Mr. Thos. B. Rogers, on so-called "Azoturia" in the horse not only from the fact of his dealing with the affection mentioned, but from his having, incidentally, drawn attention to an atrophic muscular condition of the kind by which he looks upon as one of its sequelæ.

I am very glad to find that not only on your side of the Atlantic, but in Germany also, the subject just mentioned has attracted attention, and that the opinion expressed by Mr. Rogers, as also that expressed by Bollinger, in your translation of an article by him which appeared in your October number, coincide to a very large extent with the views held and taught by myself in this school for some years—certainly for the past seven or eight. Two years ago, in a paper read by me at a meeting of the North of Ireland V. M. Association, held at Belfast, I incidentally touched upon what I have long thought was a great mistake, viz., the use of the word "Azoturia" in designating this affection, my objection to the word being that it gave no indication as to the pathology of the affection, but merely referred to a characteristic symptom of it. In my earliest lectures on the subject I suggested the use of the word "Azotæmia," but subsequently I taught, and do now teach, that the disease is to all intents and purposes a form of "Acute Uræmia," and that, in all probability, the organ seemingly at fault is the liver. In an article in the *Veterinary Journal* subsequently to the appearance of my remarks at Belfast, and in answer to a criticism thereon, I explained more fully my views as to the nature of the affection.

An attempt has been made to identify the disease with albuminaria, but I may remark, in passing, that neither my colleague, Dr. Aitken, or myself, have been able satisfactorily to demonstrate the presence of albumen in the urine in anything like sufficient quantities to bring about the conditions which exist in this malady; and even if it were proved that albuminaria is an invariable phenomenon, I should not myself attach much importance to it, seeing that we have ample evidence of the fact that there is extensive disintegration of the albumenoids, in the immense quantity of urea always present in the urine. That there is also, as is so much insisted upon by Bollinger, more or less destruction of the red cells and liberation of hæmatin, must be patent to all, as from no other source than this can we get the coloring matter in the urine, unless, indeed, it were derived from the muscles—a supposition, I may remark, that cannot be entertained, seeing that the circumstances under which the disease makes its appearance are not at all favorable to the disintegration of muscular tissue, in fact, rather the contrary.

That a hæmolytic process goes on there can be no doubt, but there must, necessarily, exist considerable doubt as to its seat or origin, and there must exist the same doubt as to its being sufficient to produce the phenomena associated with and characteristic of the affection under consideration.

If hæmo-globinomia is sufficient in itself to produce these phenomena, why do we not get identical manifestations in Red-water of Cattle? Granted that in some districts this affection is associated with neural and cerebral disturbance, such disturbance is in thousands of cases never manifested at all, and yet there can be no question as to the presence of enormous quantities of both albumen and hæmatin in the urine. Again, there is no brain disturbance seen in the disease known as "Sanguimears Ascites" (Simonds) in the sheep, except such as would naturally follow the anæmia, which is necessarily a marked feature in the malady as it is in Red-water.

In hæmoglobin-uria, produced by the injection of strong ammonia into the circulation, I have seen no evidence of cerebral disturbance after the passing off of the primary convulsions; neither does such exist in the hæmoglobin-uria, sometimes seen in animals which have been exposed to the effects of the gases liberated (especially carbon menoxide) in the process of combustion in the accidental burning of stables.

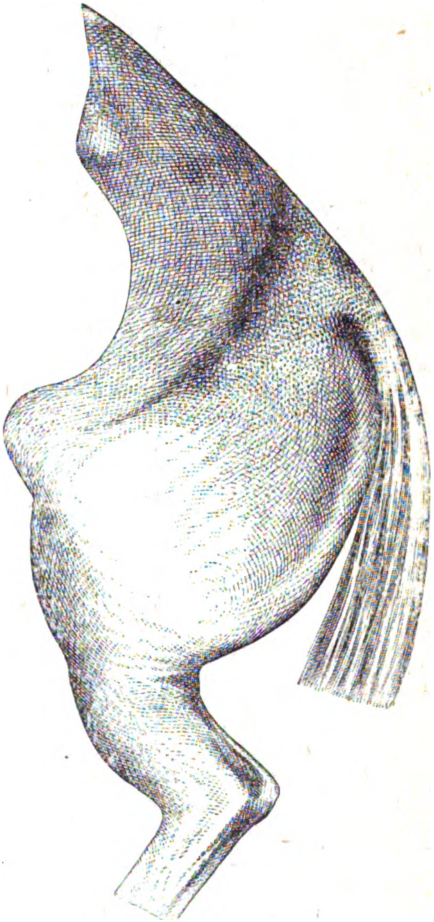
I cannot for one moment endorse the theory, held by some, that Azoturia is associated with, and is due to, nephritis—neither in the clinical characters of the disease or in the condition of the kidneys after death have I seen any evidence of it, any more, for that matter, than there is in Red-water.

That the malady is a blood disorder there can, I think, be no reasonable doubt, and that the liver is the organ largely concerned, directly or indirectly, in its production, there can be as little doubt; but as to what may be the precise nature of the forces engaged in its production, there is very much doubt. I have thought it might be due to the accumulation in the blood of some of those chemical agents of whose nature we know so little, *e.g.*, tyrosin, leucho, etc., or to uric or hippuric compounds; and most certainly I entertain the opinion, and for over twenty years have done so, that Red-water is due to the presence of excessive quantities of alkaline phosphates in the blood, as the hæmoglobin-uria of horses after exposure to fire is due to the action of one or more hæmolytic gases with which the blood becomes changed by pulmonary inhalation.

In reference to the treatment recommended by Mr. Rogers, I confess I should hesitate to give the large doses of morphia mentioned by him, nor can I understand its action, except on the supposition that it exerts an antidotal effect to the poisonous principles accumulated in the blood. I have always recommended morphia injections, or the use of belladonna and chloroform for the purpose of modifying and controlling the convulsions (when present) of acute uræmia, but I have trusted mainly to the action of powerful eliminatives and respiratory and cardiac stimulants; and, in addition, have attached great importance to the washing out of the bladder with alkaline solutions.

In connection with a sequel of acute uræmia, mentioned by Mr. Rogers, viz., "Atrophy of the Crural Muscles," I may observe that I have never met with it, and if I did I should look upon it as being due to injury inflicted upon the muscles and the crural nerve by the violent convulsive movements so often associated with the disease, or by strain received during the attempts of the patient to maintain the standing position or to regain its feet when prostrate. But, while I have not met with this lesion as sequela of acute uræmia, it is familiar to me as a result of severe injury inflicted upon the crural muscles and nerves.

Some years ago I reported several of these cases in the *Veterinary Journal*, and the sketch I send herewith was reproduced therein to show the condition of the muscles and the great prominence into which the patella is thrown by their absorption. The sketch was roughly drawn by myself from the living subject, some thirteen years ago, and elaborated subsequently by Mr. Henry Ashbie, M.R.C.V.S.—then a student in this College—and in this particular case the stifle had been severely blistered by a practitioner who looked upon the case as one of laxation of the patella. The first case of the kind which came under my notice occurred in the practice of Mr. Lawson, of Manchester, some fifteen years ago, and in that case the lesion was produced by a severe blow from the buffer of a locomotive; my diagnosis being based simply on the peculiar action of the limb in the first place, and the extensive subsequent atrophy of the muscles in the second.



An almost identical lesion is sometimes seen in the Caput muscles of the fore-limb, as the result of severe injury. I had, some years ago, four cases in Iceland ponies under my charge, at one and the same time, the injury being produced by the rough usage to which the animals had been subjected during a stormy voyage from Reijkavig to Leith; and in each instance the prominent symptom was a counterpart of that seen in Crural strain, viz., inability to support the weight of the body when it was thrown on the injured limb.

I am, yours faithfully,

Thomas Waller.

Proceedings Veterinary Medical Societies.

N. Y. STATE ACADEMY OF VETERINARY SCIENCE AND COMPARATIVE PATHOLOGY.

The last meeting of the season was held at the Pierrepont House, Brooklyn, June 12th, Dr. H. E. Earl, President, in the chair, and Dr. Charles A. Meyer, Recording Secretary. The following members were present: Louis V. Plageman, James Hamill, Harry D. Gill, Peter Peters, William D. Middleton, Thomas Robertson, William H. Rohrs, John H. Dancer, John A. McLaughlin, William Hepburn, Charles B. Uibel, Daniel Schmidt and John T. Riley. Regrets were received from Rob't Laidlaw, M.R.C.V.S., of Albany; John Lindsay, D.V.S., of Huntington; J. S. Sutcliffe, V.S., of Port Jervis; Dr. J. Freeman, of N. Y., and Dr. Peter C. Juhl, of Staten Island. The medical profession was represented by some of its most prominent members.

The principal subject of the evening was "Glanders" and "Farcy," the dreaded scourge of the equine species.

Dr. McLaughlin, of Providence, R. I., gave a detailed account of a case under his supervision in a recent outbreak in his vicinity. He carefully followed the best known authors in the etiology, symptoms, diagnosis and results, and substantiated those by his own extended experience during his official connection with the State Board of Health in New Jersey, and during his practice in R. I. His conclusions were that although glanders in its incipiency could be suppressed, still it arose from the germ of glanders, which is a specific poison of unknown chemical composition and action, and always reproduces glanders and farcy, terminating fatally.

Dr. Charles A. Meyer, of N. Y., next spoke, and supported in many respects the views of Dr. McL., but was of opinion that glanders might also be *spontaneous*, and mentioned a case which occurred in his practice, in 1882,, in a stable where there were twelve horses, which, with the stable, were in a filthy condition, and had been so for years. The horses were improperly and irregularly fed and overworked. One of the animals developed glanders, and within a month the remainder were also affected. In four months they all died. At the same time the horses of the Central Park Carriage Service, which worked in the same harness and drank out of the same trough, never contracted the disease.

How are we to account for the above circumstance, if contagion is the only means of producing the disease?

Dr. John H. Dancer, of Orange, N. J., gave his views in accordance with those of Dr. McL., and related several cases he had observed during the recent outbreak in N. J.

Dr. L. V. Plageman, of Brooklyn, asked if any one present could furnish a positive diagnosis of glanders?

Dr. Meyer replied that Prof. Virchow has said that there was no actual physical diagnosis, but there was a microscopical diagnosis to the effect that spindle-shaped cells were found within the sub-maxillary lymphatic glands. This was doubted by the majority of the members, with all due respect to the leading pathologist, Virchow.

Dr. Plageman then said that *Inoculation* was a sure test, if properly applied, but the most decisive proof was to "cut up" an affected animal *after* he was *dead*. The most useful and scientific discovery would be to diagnose correctly the disease whilst the animal is still alive, therefore inoculation was the test he advanced, to be relied on, together with a peculiar, haggard, anxious expression, the peculiar induration of the sub-maxillary lymphatic glands, the nasal discharge (glutinous), the unthriftiness of the coat, invariably loss of appetite, and many other marked symptoms, according to its duration, age and surroundings.

The chairman, in rather a sarcastic strain, stated that science had arrived at such a fine point that veterinarians knew very little of what is and what is not glanders.

Dr. James Hamill, of New York, objected to the terms glanders and farcy, but supposed they were used for want of a better, and said if we could obtain an authentic history of the glandered horse, we should find that, in the majority of cases or instances, first, he has been dull, off his feed and losing flesh, and his coat sometimes rough or staring. Also, that these appearances had for several weeks preceded, with more or less intensity, the characteristic symptoms of glanders, viz.: A continuous discharge from the nose, which discharge is sometimes so light as to be scarcely perceptible; at others to be very considerable and continue for weeks and months before the health and capabilities of the animal seemed to be injured. When pus appears in the discharge then another and very important characteristic appears, viz.: Swelling of the glands under the jaw. The lymphatic on one or both sides, more generally one side. This affection of the glands may progress until the entire glandular system succumbs to it. If the discharge be from one nostril the swelled gland will be found on that side, and there is a peculiarity about the swelled gland. The swelling at first may be large and diffused, but the surrounding swelling soon goes off and one or two small, distinct glands remain, and they are not in the centre of the maxillary space, but adhere closely to the jaw on the affected side. The membrane of the nose may materially guide our opinion at this stage. It will generally be of a dark leaden hue, or of some bluish shade. At any rate there will not be found the redness of inflammation nor the pink-red of health. Some spots of ulceration will probably appear on the membrane covering the cartilage of the nose—not simple sore spots or streaks of abrasion, and superficial, but small ulcers approaching to the circular form, with the edges abrupt and prominent or well defined—in which case there can be no doubt about its being glanders. At this stage the constitution will be evidently affected. The horse will lose flesh, the abdomen will be tucked up, the coat will be unthrifty and readily come off; occasionally a cough will be heard, the appetite impaired, the strength will fail, the discharge from the nose will grow more purulent, the ulcers in the nose become larger and more numerous. The air passages begin to be obstructed. A grating sound and sometimes choking noise will be heard at every act of breathing. The lungs are now diseased and filled with tubercles or ulcers and the horse at length dies, an emaciated and loathsome object. But as the early symptoms vary in a most puzzling degree, here our knowledge and judgment are most required.

Glanders have been confounded with strangles or distemper, with catarrh or common cold. It has oftener been confounded with catarrh than any other disease, and between those two especially we are called upon to decide. The discharge from catarrh, even when it is in the chronic form, does not feel so sticky as that of glanders; it does not form the crusty border of the nostrils as does that of glanders, and especially it does not form an upper border of the nostril, while we find that of glanders adhering all round the edge, and tending to mat the hairs together wherever it touches. Fever, more or less intense, accompanies catarrh, and the glands, if swollen, are movable, but at this stage of glanders there is no fever and the glands adhere to the jaw and are different in every way; the lymphatic glands inside the thighs become prominent and will suppurate. But in farcy all the absorbents of the skin seem to be affected at once, and the glands suppurate and discharge the same sticky matter as from the schneiderian membrane. Those suppurating openings are then known as farcy buds. The increase of these buds marks the progress of the disease, and although farcy itself often assumes different forms, the result of the disease is the same as that of glanders. It is only important in the early stages to diagnose between glanders and farcy, because only in the early stages is there any opportunity—with our present knowledge—of combating this disease, or these two forms of the same disease. In fact, some writers have claimed that there are three forms of this disease. Turner, for instance, has proposed a third kind, which he calls the insidious. This brings up another debatable point. Is glanders a specific poison? I know the greater number of authorities claim that glanders is a specific poison, and must be reproduced by glanders, and nearly all claim that it cannot be cured, and that no case of glanders ever was cured, and that the only proper treatment is to destroy every infected and suspected animal, and burn the carcass. To this line of action there are some objections, and, while I admit that every precaution must be taken to prevent other animals and man from being affected by it, I claim there is a time and a stage of the disease when it can be controlled, or probably, I should say, suppressed. If we were to stamp out glanders from the world entirely, would it not reappear under certain conditions? I, for one, claim that it would, just as syphilis would reappear if it were stamped out.

The history of glanders equina covers a period of 1500 years, and during that time, for every death of glanders in man produced by contagion from the horse, there is over one million of deaths by syphilis. Yet, do we ever hear our State authorities, or boards of health, recommend the stamping out *by death*, of all infected and suspected human beings? Therefore, why should we, under false impressions, destroy the horse when we can probably control or suppress his disease by the same measures as are used in the human disease above-mentioned, which is far more dangerous? Can it not, also, be shown that syphilis is the cause of tuberculosis in man, or rather, is there not some connecting link? I think there is.

Virchow has shown that syphilis exists in the "wild" hare of Europe; that the primary lesions are in the genital passages, and constitute in their microscopic character a connecting link between *tuberculosis* and *gummatous* *growths*, so that one observer claims that this disease was not syphilis, but *tuberculosis* conveyed from animal to animal by sexual contact, and modified in the transit; and, to quote the words of a visitor present, Dr. Frederick Muro, which he learned from his preceptor, consumption was scrofula, scrofula was leprosy, and leprosy was syphilis modified in its passages from one to another.

It is a well-known fact that syphilis exists among the native horses in India, that the native mares have infected European stallions, and it has been asserted that horses affected in this manner have died of tuberculosis.

I now put the question to any member present: Has tuberculosis ever been cured? Now, we know the worst form of glanders is the tuberculous form. Is there any difference in tuberculosis, either in equine, bovine or human species? We find a connection between syphilis and tuberculosis in the human and a similar connection between glanders and tuberculosis in the horse, and there is a similarity of a diseased condition of the frontal and nasal bones in the *syphilitic human* and the *glandered horse*.

In support of Turner that glanders might occur spontaneously, otherwise, how could we account for well-authenticated sudden outbreaks of the disease, as in the British expedition to Quebourn in the year 1800, and in another, to the Crimea, in 1854.

The Chairman contended that it might originate by absorption from foul emanations—horses standing over ammoniacal gases, breathing a vitiated atmosphere and closely confined in hot and ill-ventilated buildings.

Dr. Plageman asserted that the disease was a specific poison which might be generated in the system by over-work, low diet and poisoned atmosphere.

Dr. McLauglin held that it was a disease produced by the virus of glanders, which must always be glanders or farcy, or why would it produce the same disease by inoculation, and asked what was its chemical composition; if of spontaneous origin?

Dr Peters disagreed with Dr. Hammill, for during his experience in the army, he found that horses not confined in close, vitiated atmospheres were subject to glanders, but admitted (without giving any reason) that the liability was greater during the time of war than in the time of peace.

Dr. Robertson quoted a case of syphilis in the eye of a horse, produced by inoculation from man, and it was subsequently admitted by the groom in charge that he had maliciously inoculated the eye of the animal.

Then the question was asked by several members was that specific poison syphilis? If so, the theory of Drs. Hammill and Moore would go to prove that a specific disease does not always produce the same disease when transmitted from one animal to another.

Dr. Hammill closed the debate by stating that the disease (glanders) originated in the pituitary membrane, its chemical composition being unknown, but upon that membrane the proof of glanders was looked for, and that any foul irritant or poison acting on this delicate membrane would probably receive its *specific character* by being absorbed.

The next meeting will be held at West Brighton, Richmond Co., N. Y., on September the 11th, 1885.

Dr. Plageman volunteered to read a paper on "Colic and Constipation."

Dr. Meyer one on "Mamitis in the Cow."

Dr. Reily, M.D., one on "Comparative Pathology of the above Diseases."

ONTARIO VETERINARY COLLEGE.

The closing exercises and presentation of prizes in connection with the Ontario Veterinary College, took place in the lecture-room of the College. Dr. A. Smith, Principal, presided. Amongst the gentlemen present were the following: the Lieutenant-Governor, Col. Gzowski, Prof. Goldwin Smith, A. Blue, Deputy Minister of Agriculture; Henry Wade, Secretary, and Mr. Moore, President Agriculture and Arts Association; Dr. Thorburn, Capt. Geddes, Dr. C. J. Alloway, Montreal, and the following Examiners of the College: Wm. Cowan, Guelph; Charles Elliott, St. Catharine's; A. Coleman, Ottawa; J. H. Wilson and J. O'Neill, London; T. Lloyd, Newmarket, and C. Sweetapple, Oshawa.

In opening the proceedings, Dr. Smith said the college was instituted in 1864, and in 1866 three gentlemen graduated. Since that time there had been a regular increase in the number of graduates. The past session had been the most successful since the college was opened. They had had students from all parts of the United States and the Dominion of Canada. Those gentlemen who had graduated in former years had been successful in their practice and had commanded the respect and esteem of the communities wherever they were located. There were a number of the graduates employed with the U. S. cavalry, and others were connected with veterinary colleges and occupied prominent positions. Since last session they had lost an old and valued friend, the late Prof. Buckland. He had done a great deal to advance veterinary interests in Canada. He had given a course of lectures on breeding, and the general management of stock, etc.

The prize-list was read by Dr. Duncan, and the prizes were presented by the Lieutenant-Governor, who made a few remarks after the presentation. He said he was present two years ago, when he had listened to a most excellent account of this institution, and of the success with which it had met. He was glad to be present on this occasion and hear a still more flattering report of the progress of the college. He complimented Dr. Smith very highly in the reputation which the college had attained, as was shown by the number of students from abroad who attended it. Col. Gzowski also spoke in flattering terms of the progress made by the college, and the work it had accomplished in the interests of the profession.

GRADUATING CLASS.

The names of the students who form the graduating class were read by Dr. Duncan as follows: John James D. Banting, Cookstown, Ont; E. R. Barnett, Smith Road, Ohio; Wm. F. Berry, Marion, Ohio; Felty A. Bolser, Newcastle, Ind; Charles Burger, Hornby, Ont; Tait S. Butler, Stirling, Ont; Jas. E. Callin, Shakespeare, Ont; Harry E. Carpenter, San Francisco, Cal; Charles Chrisman, Sharon Centre, Ohio; Eli Chrisman, Sharon Centre, Ohio; Matthew C. Crawforth, Whitby, Ont; H. E. Delavergne, Kirkland, Ill; Perry K. Dreibelbis, Lenhartsville, Pa; Thos. G. Duff, Cookstown, Ont; John E. Embury, Ingersoll, Ont; Geo. H. Farnsworth, Chester, Vt; O. D. Franks, Doylestown, Ohio; A. E. Gable, Meadville, Pa; Peter J. Gallaher, Allentown, Pa; John A. Gourlie, Summerside, P. E. I; Robert B. Grant, Dumblane, Ont; W. D. Gross, Rutztown, Pa; Frederick G. Hall, Southampton, Eng; Reuben R. Hammond, Villa Nova, Ont; W. H. Harbaugh, Cumberland, Md;

David W. Hess, Trenton, Ont; Wilson Huff, Napanee, Ont; A. L. Hunter, Hector, N. Y; J. W. Ireland, Laskay, Ont; Wm. J. Johnson, Summerville, Ont; W. J. Johnson, Croton, Ont; T. E. Jones, Granville, Ont; W. Kenney, Lindsay, Ont; J. Lawson, Almonte, Ont; J. A. Lee, Belleville, O; J. B. Lindsay, Hockley, Ont; Angus McDonald, Metcalfe, Ont; G. McGillivray, Whitby, Ont; Duncan E. McLean, Pilot Mound, Manitoba; Frank D. McMahon, Chicago, Ill; J. A. McTaggart, Milton, Ont; Archibald G. McVean, Woodbridge, Ont; F. Mathews, Northampton, Eng; Joseph N. Medill, Huston, Ont; Richard J. Michener, Waynesville, Ohio; Geo. D. Miller, Rix Mills, Ohio; Joshua Miller, Mooresville, Ont; John D. Milne, Claremont, Ont; Thos. Alex. Milne, Claremont, Ont; Wm. C. Mitchell, Tilsonburg, Ont; A. H. Moody, Grand Rapids, Mich; Geo. C. Moody, Leslie, Mich; W. W. Munger, Galesburg, Mich; C. E. Munn, Lowell, Mass; Jos. T. Natress, Woodbridge, Ont; W. D. Paxton, Fredericksburgh, Ohio; Harry B. Platt, St. Louis, Mo; Charles H. Pierce, Grand Rapids, Mich; Samuel E. Queen, Mechanics' Town, Ohio; R. J. Quin, Edmonton, Ont; Thos. W. Scott, Duncreif, Ont; Wm. R. Shannon, Rosemont, Ont; W. S Shimer, Jr., Shimersville, Pa; Geo. Standish, Esquesing, Ont; Wm. Stevens, St. Mary's, Ont; Walter S. Tomlinson, North Henderson, Ill; Geo. Waddle, Port Dover, Ont; Alias S. Walmer, Harrisonburg, Va; Lewellyn D. Williams, Pontypridd, S. W; Wm. J. Wilson, London, Ont; Wm. Wilson, Ballymony, Antrim Co., Ireland.

THE CHICAGO VETERINARY COLLEGE.

On the 31st of March the closing exercises of this College were held. The attendance was quite liberal, a number of ladies lending their presence to the occasion. On the platform sat Profs. Baker, Withers, Sheppard, Periam and Hughes, while the graduates were ranged in front of the platform. Messrs. T. L. Armstrong, of Indianapolis; S. S. Baker, of Chicago; P. Quentman, of Chicago; Will J. Miles, of Charleston, Ill; J. S. Spangler, of Plainfield, Ill; A. Dean, of Girard, Mich., and A. S. Ziegler, of Lincoln, Ill.

The address to the graduating class, delivered by Prof. Withers, was full of feeling and sound advice as to the course to be pursued in establishing a practice. He complimented them on their energy, studious character and the tenacity with which they wrestled with the complex and complicated, till victory was assured. He spoke feelingly of the pleasant relations existing between the students and the faculty, and was sure that the class now going forth to battle for the cause of humanity and science would win honors and succes for themselves, and in so doing bestow honors upon their Alma Mater and help her to disseminate the seeds of learning broadcast. The Professor alluded to the vast extent of our territory, developed and to be developed, the vast field open for the educated veterinarian, the fact that the general public is rapidly becoming educated to the appreciation of the graduated veterinarian and a proper degree of deprecation of the would-be cure-all efforts of the "hoss" doctors and "rubbers." A number of useful hints and suggestions were given to the doctors, and the Professor then presented the diplomas.

The Valedictorian of the Class, Dr. S. S. Baker, then delivered his address. —*Horseshoer's and Hardware Journal.*

ANNUAL MEETING OF MASSACHUSETTS VETERINARY ASSOCIATION.

The second annual meeting of the Massachusetts Veterinary Association was held at Young's Hotel, Boston, Wednesday evening, April 1st.

The President, Dr. W. Bryden, occupied the chair, and there were present thirteen members, viz.: Drs. Billings, Blackwood, Bunker, Alderman, Harrison, Osgood, Skally, J. S. Saunders, Sherman, Winslow, Winchester and Howard.

After reading of minutes of the previous meeting, and their adoption, the name of A. W. Clement, V.S., was proposed for membership, his credentials having been previously favorably reported on by the executive committee.

On ballot he was unanimously elected to membership.

Election of officers for the ensuing year was next on the order of business and resulted as follows, the vote being a unanimous one: For President, F. S. Billings, V.M.; for Vice-President, J. S. Saunders, D.V.S.; for Secretary and Treasurer, L. H. Howard, D.V.S.; for Executive Committee, J. M. Skally, V.S., W. Bryden, V.S., W. T. Simmons, M.R.C.V.S.

On retiring from the chair Dr. Bryden, in a few remarks, kindly thanked the officers and members for their hearty co-operation in this, the first year's work of our association, and predicted for us a most successful future.

Dr. Billings assumed the chair, and a vote of thanks was tendered the retiring officers.

At the suggestion of the President it was *voted* that a committee be appointed to consider the matter of procuring a charter for the Association.

According to the remarks of some of the gentlemen, the present session of the Legislature is already too-far advanced to grant a *special* charter, that is, by legislative act, though a charter under the *general laws* may be obtained at any time.

The general sentiment seemed to be in favor of a special charter, but after some discussion of the subject it was left to the discretion of the committee appointed, viz.: Drs. Bunker, Bryden and Winchester.

Thus far all meetings of the Associations having been held in Boston, Dr. Billings suggested that an assembly in another part of the State might be productive of good, by creating in other sections an interest in our work and meetings.

Dr. Winchester suggested as a compliment to Dr. Osgood, of Springfield, who has been a very regular attendant at our meetings, and a much-interested member, that the next meeting be held at Springfield.

On Dr. Winchester's motion to that effect, it was *voted* that the next meeting of this Association be held at Springfield: the date of meeting was afterward appointed May 1st, at 8 oclock, P.M., Dr. Osgood being asked to make all necessary arrangements for our accommodation, etc.

The essayist will be Dr. Billings, who will demonstrate Koch's method of bacteria cultivation.

On motion of Dr. Osgood it was *voted* that the members of the medical profession in Springfield, the Connecticut Veterinary Medical Society, Drs. J. & Geo. Penniman, of Worcester, and Dr. Brackin, of Pittsfield, be invited to be present.

Dr. Bunker then exhibited a very interesting pathological specimen, viz., an embolism of the femoral artery, nearly eight inches in length.

The history of this case in brief is, that about six weeks previous the animal, a chestnut gelding, eight years old, showed lameness in right hind leg. He would start from the stable sound and begin to show lameness when he had travelled about a-third of a mile, which lameness kept increasing as he went further, till it became very severe. On being allowed to stop, the animal would raise and lower the leg in an uneasy manner for a few moments, and finally remain quiet; the temperature of this leg being much lower than the other, in fact *cold.* These symptoms continued with more or less variance for six weeks, when the animal was destroyed and the post-mortem examination revealed the embolism mentioned.

At eight o'clock dinner was announced, and the company adjourned and partook of a very bounteous repast, some two hours being spent at table in consumption of the edibles, and listening to very pleasant toasts and after-dinner remarks.

The meeting, again called to order, listened to the reading of a paper by Dr. Harrison, on "Amputation of the Penis."

The essayist noted the indications for operation, calling attention particularly to carcinomatous affections. He then described in detail the *modus operandi,* recommending that the *urethra* be not divided at the point of amputation of the *body* of the penis, but that it be left projecting about an inch, this portion to be divided and the flaps secured back by sutures.

He mentioned four cases in which this operation had been successful and afforded permanent relief; and one case in which the amputation had been effected with the ecraseur, dividing the entire structure of the penis at a given point, the result being fatal.

Some discussion of the subject took place, participated in by Drs. Bryden, Saunders, Winchester, Skally, Osgood and Billings, and it was *voted,* on motion of Dr. Osgood, that the discussion be continued at the next meeting.

A vote of thanks was tendered the essayist, and the meeting was adjourned.

L. H. HOWARD, Secretary.

MEETING AT SPRINGFIELD, MASS.

The regular monthly meeting was held at the Massasoit House, Springfield, Mass., Friday evening, May 1st.

President F. S. Billing occupied the chair, and there were present Doctors M. Bunker, of Newton; J. E. Gardner, of Greenfield; F. H. Osgood, of Springfield; J. S. Saunders and L. H. Howard, of Boston; J. F. Winchester, of Lawrence, and Charles Winslow, of Rockland; also, as invited guests, P. LeB. Stickney M.D., and W. W. Gardner, M.D., of Springfield; Dr. A. R. Rice, Chairman Springfield Board of Health; Dr. Forrest, of Rockland; Dr. Bland, Secretary Connecticut Veterinary Medical Society; Mr. W. H. Wilkinson, of "Brightside Farm," Holyoke; Messrs. Myrick, of *N. E. Homestead,* Lyman, of *Springfield Republican,* and Geddings, of *Springfield Union.*

The record of previous meeting was read and accepted, and the general order of business was omitted to listen to a paper by Dr. Billings, Part I. being an essay on "State Medicine," and Part II. a demonstration of Koch's method of bacteria cultivation.

All present were very much interested, and at the conclusion of Dr. Billing's remarks a unanimous vote of thanks was tendered him.

Dr. Stickney, of Springfield, said that he had been very much interested both in the paper on state medicine and in the practical illustration of bacteria cultivation, and thought that the address on the former subject ought to be published broadcast.

He also remarked that veterinary medicine ought to be more fully recognized, and that he was ready, as a prantitioner in the department of human medicine, to extend to it the right hand of fellowship, appreciating fully how its investigations and results can assist those in the sister branch of the same great science.

Dr. A. R. Rice, Chairman of the Springfield Board of Health, said that he wished to endorse the remarks of Dr. Stickney and to compliment highly the paper on state medicine.

He said that he was ashamed of the State of Massachusetts not having a law to regulate the practice of medicine, becoming, as it is, the "Botany Bay" for charlatans and quacks.

Dr. W. W. Gardiner, of Springfield, remarked that he had been a member of the Massachusetts Medical Society for many years, but had never yet listened to a paper which he felt was of so much importance as the one he had heard this evening.

Mr. Myrick, of the *Homestead*, spoke of the increasing interest in veterinary matters which he had noticed among the farmers, and said that the increasing demand for veterinary surgeons was a sign of the times.

Dr. Thomas Bland andDr. Forrest complimented highly the papers to which they had listened, and expressed their appreciation of the good fortune enabling them to be present at a meeting of the Massachusetts Veterinary Association.

Dr. Bunker, of Newton, then exhibited a pathological specimen, œdema of the glottis in a cow. The glottis was entirely closed, the cellular tissue all about being filled with serum, larynx somewhat inflamed.

The symptoms were sudden in their development, respiration becoming rapidly hurried and short, tracheotomy not being performed becanse the animal was destroyed for the butcher at the end of twelve hours.

At ten o'clock the company adjourned to the banquet-hall, where the next two hours were spent at dinner, after which we listened to very pleasant after-dinner speeches by the different members and their guests.

The meeting was subsequently called to order, and quite a discussion took place in regard to the "subscription plan" as pursued by veterinary institutions in general, and Harvard Veterinary School in particular.

It seemed to be the general opinion that the system was decidedly unjust to the practitioner, and derogatory and detrimental to the best interests of the profession.

On motion of Dr. Howard, it was unanimously *voted* that a committee of three be appointed by the chair, to prepare resolutions censuring the system.

The chair appointed as that committee: Doctors Saunders, Bunker and Howard.

A unanimous vote of thanks was extended to Dr. Osgood for his courteous attention to the Association while in his city.

The chair appointed as the essayist for the next meeting Dr. Alderman, and Dr. Bryden for the next meeting following.

No other business coming before the meeting, it was adjourned, all present expressing the opinion that the meeting had been an enjoyable one, and fraught with much good to our Association. L. H. Howard, Secretary.

REVIEWS.

THE FIRST ANNUAL REPORT BUREAU OF ANIMAL INDUSTRY.

We have before us the First Annual Report of this newly-created bureau, with reference to the contagious diseases of the domestic animals in the United States for the year 1884. It is a work which should be in the hands of every stock raiser in the country, and especially every veterinarian. We recommend those of our readers that have not yet received this book to at once write the Agricultural Department, at Washington, for a copy; without it they cannot know what has been done, nor what needs to be done, nor of the many difficulties which still lie in the way of doing good work. Every unbiased mind must become convinced of several things in reading this report:

1st.—That we, as a profession, have a most creditable representative in Dr. D. E. Salmon, Chief of the Bureau;

2d.—That it is the best and most complete report yet issued by our government upon this important subject;

3d.—That a much more extensive veterinary police organization over the country is necessary than we have at present, and that we must endeavor to make not only the United States Government, but the respective State governments, realize the necessity of giving employment to as many qualified men as possible if they would really do their duty to the citizens of this country.

The report, in every way, confirms the views we have been advocating for the past ten years; so much so, in fact, that many of our words would seem to have borne the spirit of true prophecy.

In this JOURNAL, but especially in our book "On the Relation of Animal Diseases to the Public Health," we have repeatedly drawn attention to the futility of State work so long as there was no concentrated action, or the doctrine of State rights was adhered to, and of the absolute necessity of one and the same code of laws for every State in the Union, and one veterinary police force emanating from a head-centre at Washington. We find that experience has more than endorsed our teachings.

Our ideas of the importance and urgent necessity of a national veterinary police also find their confirmation in Dr. Salmon's experiences, which he sums up as follows:

"A national direction of the work for the extermination of pleuro-pneumonia," (which he estimates costs the country in direct and commercial injury about $4,000,000) "would overcome at once the discouraging features which have done so much to prevent the efforts of the individual States from being effective. With inspectors in every infected State, the shipment of diseased cattle would soon cease, new outbreaks would thus be prevented, and the danger which has so long menaced the great cattle interests of the country, would be removed. The work would be more thorough, because those engaged in it would not be either directly or indirectly dependent upon the good-will of the interested cattle owners for their positions, and the plea of inability to pay for the diseased cattle which should be slaughtered would also be overcome. These have been the principle obstacles to the success of State action, and practically they are so great as to make it next to impossible for the States alone to free themselves from this plague."

At last we have a veterinarian at Washington who is not afraid to publish the exact condition of things in his report.

The year 1884 was marked by a great and dangerous extension of that bovine pest, contagious pleuro-pneumonia, over the country. Up to this time it had been limited to a few of our Atlantic sea-board States. It also extended west over the Alleghenies, for the first time being taken from Maryland with some grade Jerseys, to Troy, Ohio, from whence it was transported to Virginia, Ill., and by means of an extensive sale of cattle, dispersed largely over Illinois, and found its way into Kentucky. Some of these cattle from Virginia, Ill., also went into Missouri, and as we have lately heard of the disease appearing there, and as we know well its peculiarly insidious nature, and that it frequently occurs in so mild a form in individual cases as scarcely to attract attention, is it not possible, and also probable, that this whole extension is one chain extending originally from Maryland, with a link missing here and there, to Missouri at present, and no one knows where it will next show itself.

The question that at once comes to mind is: Who is to blame for all this damage? It cannot be the United States Government, for the report shows that the veterinary authorities have done all they could under existing circumstances. The blame is to be found in the want of intelligence of the people of the country as we find it represented by their respective legislators.

The State authorities have not had the courage to admit the truth, because of their fear of losing votes or influence, or injuring the animal industry of their State. They should follow the brave example of the United States authorities, for in this report we find that the truth will come out and always must, eventually. The report calls especial attention to the fact that there is a steadily increasing trade in calves and grade cattle from the infected States to the west, which must certainly be a constant source of danger that can only be checked by the organization of a trustworthy veterinary police in the afflicted States Even now the governors of some of the Territories and western grazing States are threatening to quarantine cattle from eastern States, unless accompanied by certificates from State veterinarians. It would be interesting to know how many of the eastern States have trustworthy and competent State veterinarians.

Although no veterinarian of any education would utter a doubt as to the contagiousness of this bovine lung pest, still it has been found that history repeats itself in this country in this as with many other things, and that many reports were being circulated with regard to the non-contagiousness of this disease. It was therefore right that the Bureau should take cognizance of this fact and show by direct experiment that the bovine lung pest is now. as it always has been since known to history, a strictly contagious disease.

The malignant character of the inficiens when introduced into the subcutaneous tissues was well shown by injecting small quantities of the same into the tissues in the vicinity of the shoulder. Intense inflammatory reaction resulted, leading to the death of two out of three animals.

It was also found that animals taken from a region in which the disease was known to have existed were not so susceptible to infection from cohabitation with known diseased ones as those from entirely uninfected districts. Whether or not the first had had the disease in the mild form it often assumes was not to be ascertained. Of four healthy cows from West Virginia exposed to contagion in the above manner from May 1 to 5, No. 1 had a severe cough, with pulmonary complication, and a temperature of 105 1-5 on the 23d of May. No. 2, the same on the 1st of June; No. 3, on May 25th; No. 4, on June 9th. All of them exhibited the known lesion of contagious pleuro-pneumonia at the microscopical examination.

At Barren Island, a place where there had never been any disease, the government built a stable and introduced 18 cows and 13 calves from Canada, where the disease has not yet appeared. With these cattle were placed five diseased ones from that pest-hole, Brooklyn.

Of these 31 animals, 21 contracted the disease between the 20th of Sept., 1884, and Jan. 3, 1885. European experience has shown that 21.5 per cent. of the animals exposed to contagion acquired this disease, and in this country, so far as can be estimated, the percentage of actual infection is approximately the same—28.2 per cent.

In this connection, we would mention that Dr. J. F. Winchester, veterinary surgeon at Lawrence, Mass., and lecturer at the Massachusetts State Agricultural School, recently sent to us a small piece of lung from a cow that had the strongest resemblance to contagious pleuro-pneumonia that we have ever seen. Our diagnosis was primarily broncho-pneumonia, extending to interstial, and finally becoming parenchymatos also. Pleuritis was also present; in the letter that came after the specimen had been examined, he does not state anything as to an effusion having been present in the pleural cavities, but that the disease "had been caused through drenching the cow." The marbled appearance was quite marked, but on making a section of diseased parts it was not followed by the flow of serum that occurs in recent pleuro-pneumonia. The parenchymatos affection was more evenly distributed than in the contagious form, and there was no indications of approaching necrosis, as in that disease, but, most important of all, there was none of that *œdematous anœmic atalutasis*, so frequent in the contagious variety, which is to be looked upon as the cause of the necrosis of parts of the lungs and breaking down of the tissues.

To us one of the most interesting communications in this report is the description of the experiment station and laboratory of the Bureau, situated in the vicinity of Washington, Dr. Rose being the superintendent of the former, as Dr. Salmon must be of the latter. As known to our readers, we have long been advocating the necessity of such an institution.

The corner-stone having been laid, there is nothing in the way of Dr. Salmon making his name immortal by persistently using his position and abilities to influence Congress to the foundation of a National School of Comparative Medicine at Washington, as we stated in an editorial in our last issue.

An article for which we have waited with the greatest interest is Dr. Salmon's contribution upon the outbreak in Kansas in the winters of 1883-4, which has been designated under so many names or causes, but which was either foot and mouth disease, or as Dr. Salmon calls it, ergotism. We must confess that while reading Dr. Salmon's article on the subject that the views and descriptions given by him have served materially to confirm our previous opinion that it could not have been the contagious foot and mouth disease. On the other hand, we have been favored with the unpublished report of Mr. McEachran, of Montreal, the head of the veterinary police of Canada, who as positively asserts that the disease was foot and mouth.

We must confess that we still adhere to Dr. Salmon's conclusions, notwithstanding our great respect for the abilities of our friend in Canada. We have heard that Dr. Holcomb has also made a report to the government of Kansas in which he adheres to his first expressed opinion that the disease was foot and mouth. This is certainly a case where the "doctors" that were present and in person examined all the conditions and collateral circumstances did not agree. We have, therefore, decided not to consider this part of the report of the Bureau at present, but to obtain Dr. Holcomb's report and give our readers a synopsis of the evidence of all these professionals, leaving them to judge for themselves; one thing they may be sure of, the careful study of this part of Dr. Salmon's report is the best article on ergotism that they can gain access to, for his position at Washington gives him access to the National Medical Library, the finest in the world, an advantage which none of us possess, and he has used it with great benefit to all of us.

This volume also contains several reports from various others of its agents with reference to the animal interests of the country such as stock-raising on the plains, transportation, slaughtering, etc.

Mr. James Law gives a condensed report of the occurrences at the late Veterinary Congress at Brussels, in which he advocates the ideas of a veterinary police and education of veterinarians.

There is also an interesting translation, accompanied with illustrations, of syngamus trachealis, of an article by Meguin, a noted French helminthologists, upon the gapes in fowls.

There is also a report on trichiniasis which, while instructive, adds nothing to our knowledge, the government having still overlooked this important question, not having inaugurated any investigations into the origin of trichinæ outside the porcine organism; a duty which it is to be hoped the present Commissioner will fulfill.

The report is well printed and illustrated, and should be read by every veterinarian in the country, for upon the subjects on which it treats it is a better text-book than any other they have access to, and contains much interesting and collateral information. B.

BERLIN AS A MEDICAL CENTRE. A Guide for American Students and Practitioners. By Horatio R. Bigelow, M.D. New England Publishing Co., Sandy Hook, Conn., 1885.

This little book, of about 100 pages, is destined to fill a much-needed want to American medical men desiring to visit Berlin for study, and is not without value to any person proceeding Europewards.

He begins by telling one how to get to Europe, and then carries him to Berlin, recommending hotels, boarding-houses, restaurants, book-sellers, etc., and thereby doing much to save the uninitiated from falling into the hands of the innumerable swindlers that throng any great city. From some six years of life in medical Berlin we can certainly appreciate the value of this book to any one going there. The only objection we have to it is the ridiculously low scale of expenses which the author places as among the possibilities.

Berlin is one of the very dearest cities in the world to live in; especially is it so to one who cannot eat the ordinary fatty, unsavory German cooking. When the author says a person can go to Berlin, and study for six months, and return to New York, for either $154.09 or $340.00, he labors under a mistake. All we can say is this, that any medical student who desires to go to Berlin, live like a gentleman should, without a cent of extravagance, study hard, dress well, and eat well, must calculate on at least $75.00 per month for living expenses alone, and will find $100.00 a much more convenient sum. Books and instruments cannot be bought on any such allowance.

The author recommends pensions or boarding-houses. They may do to go to until one is acquainted, but far better are any of the second-class hotels recommended by him, taking a room only and eating at pleasure. With due regard to the cautions given about hiring rooms, one can find pleasant rooms and kind attendance more easily in Berlin than any American city.

Except that the book is liable to deceive about expenses, it is an admirable guide to all.
B.

HAY FEVER. By Chas. E. Sajous, M.D. Philadelphia, F. A. Davis, Att'y, 1885.

A little more than 200 pages are here devoted to the pathology, symptoms, and treatment of a disease which has hitherto puzzled, not a little, the profession, and brought discomfort and suffering, without hope of relief, to many unfortunates. The author has had great success in the treatment, which consists in a superficial organic alteration of the nasal mucous membrane by the application of an escharotic.

We have no doubt the book will be of great service to the profession.

THE OLEATES. By John V. Shoemaker, A.M., M.D. Philadelphia, F. A. Davis, Att'y, 1885.

This little book is invaluable to those who have occasion to treat cutaneous diseases. They will acknowledge, on reading it, that the oleates are destined to hold an important place in the therapeutics of the skin.

Its size permits it to be carried in the pocket, and its price ($1.00) brings it within the reach of all.

OUR LIVING WORLD. An Artistic Edition of the Rev. J. G. Wood's Natural History. Revised by Joseph B. Holder, M.D. New York, published by Selmar Hess.

Students and others interested in Natural History will hail with pleasure the appearance of this interesting work. It is written in good style, the engravings are excellent, and the fact that the services of Dr. Holder have been employed in revising it is a guarantee of its superiority in every respect.

TWELFTH ANNUAL REPORT OF THE NEW JERSEY BOARD OF AGRICULTURE. Trenton, 1885.

This volume, besides the portion devoted to agricultural subjects, publishes addresses made by Drs. J. D. Hopkins, E. M. Hunt, W. B. E. Miller, on Diseases of Domestic Animals, and Dr. Wm. Herbert Lowe, of Paterson, on "Canine Madness in our Midst," showing that hydrophobia is on the increase in that State, and calling for legislation to have the power vested in the proper officials to destroy dogs on reasonable suspicion of having the disease.

BOOKS AND PAMPHLETS RECEIVED.

ELEVENTH ANNUAL ANNOUNCEMENT OF THE AMERICAN VETERINARY COLLEGE, 1885.

ANNUAL ANNOUNCEMENT OF THE NEW YORK COLLEGE OF VETERINARY SURGEONS AND SCHOOL OF COMPARATIVE MEDICINE, Session, 1885-6.

DISINFECTION AND DISINFECTANTS. Preliminary Report made by the Committee on Disinfectants, of the American Public Health Association.

ANNUAL CATALOGUE OF THE MICHIGAN AGRICULTURAL COLLEGE, 1884-5, Lansing, Mich.

VARIATIONS IN THE FORM OF THE BEAK, that takes place during its growth in the short-tailed Albatross. By Dr. R. W. Shufeldt, U.S.A., Fort Wingate, New Mexico.

JOHNS HOPKINS UNIVERSITY CIRCULARS.

ANNALS ET BULLETIN DE LA SOCIÉTÉ DE MEDICINE DE GAND.

JOURNALS—The Veterinarian, London; The Veterinary Journal, London; The Quarterly Journal of Veterinary Science in India; American Veterinary Review, New York; Der Zoologische Garten, Frankfort; Schweizer Archiv fur Thierheilkunde, Zurich; Archiv fur Wissenschaftliche und Praktische Thierheilkunde, Berlin; Wochenschrift fur Thierheilkunde und Viehzucht, Augsburg; Giornale di Anat Fisiol e Patol, degli Animali, Pisa; Il Medico Veterinario, Torino; La Clinica, Veterinaria, Milano; La Cronica Medica, Valencia; El Ensayo Medico, Caracas; Le Progres Medical, Paris; Kansas City Review of Science and Industry; The College and Clinical Record, Philadelphia; New England Medical Monthly, Sandy Hook; Nashville Journal of Medicine and Surgery; The Southern Clinic, Richmond; Chicago Medical Journal and Examiner; The Western Medical Reporter, Chicago; Journal of Cutaneous and Venereal Diseases, New York; Denver Medical Times; The St. Joseph Medical Herald; The Weekly Medical Review, St. Louis; The Polyclinic, Philadelphia; Medical World, Philadelphia; Texas Courier-Record, Fort Worth; The American Journal of Ophthalmology, St. Louis; Pacific Medical and Surgical Journal, San Francisco; New York Medical Journal; American Psychological Journal, Philadelphia; Leonard's Illustrated Medical Journal, Detroit; Kansas City Medical Index; The Therapeutic Gazette, Detroit; North-western Lancet, St. Paul; Indiana Medical Journal, Indianapolis; Horseshoer and Hardware Journal, Chicago; The Blacksmith and Wheelwright, New York; National Live Stock Journal, Chicago; The Breeder's Gazette, Chicago; Cultivator and Country Gentleman, Albany; Weekly Drover's Journal, Chicago; The Chicago Tribune; Jersey Bulletin, Indianapolis; Turf, Field and Farm, New York; The Canadian Breeder, Toronto.

OBITUARY.

WILLIAM C. SPOONER, M.R.C.V.S.

Veterinarians have lost an old and valuable associate in Mr. Spooner, who died at Eling, near Southampton, May 3, in the 76th year of his age. He was known in this country chiefly through a work on the horse by Youatt & Spooner," which was at one time a standard authority. His other works, "Cattle Medicine," "Compendium of the Veterinary Art," and "Sheep; their History, Anatomy and Diseases," passed through several editions. During the latter part of his life he devoted himself exclusively to agricultural pursuits.

Progress of Veterinary Science.

GENERATIVE ORGANS OF THE ELEPHANT.—The testes are small, globular, situated against the ilium, and suspended, each in its special tunica vaginates, freely in the abdomen below the posterior extremity of the kidney. The epididymis lies on the outer side, and the veins are remarkable for their number, large size and free communication. There are four prostrate glands. The free end of the penis is described as resembling a canal with a Y-shaped orifice. The female generative organs are in some respects very remarkable. The womb is almost wholly divided into two horns, and there is in the unimpregnated female a well-marked hymen. The vulva is very long, and so curved ordinararily that its loose external opening hangs down, and very like and in the position occupied in the male by the penis. It forms a regular prepuce to the clitoris, which in the young specimen examined by me was very like a small penis, and measured over a foot in length.—*Journal Veterinary Science in India.*

CASTRATION OF THE ELEPHANT.—Anatomical examination has shown that it is possible to reach the testes through an incision in the abdominal wall, but the operation must be performed on both sides. The huge bulk of the animal necessitates his being drawn into a hole dug in the ground after being thrown and properly secured. Then it is found that an incision in the usual position is of little use, for the animal, being "well ribbed up," the operator's arm is numbed by the severe compression it suffers between the last rib and the hip bone. An incision lower down is not of much value, because the testes is difficult to reach and the arm introduced through the wound is numbed by the pressure of the powerful abdominal muscles, as to prove to be unable to draw the testes down from its superior attachments, even if a fair grasp could be obtained (which is not generally the case). Thus it is evident that all attempts to perform this operation without chloroform and the instrument known as the ecraseur must be useless. Whether it can be done with these aids remains to be seen. Possibly division of the nerves of the penis might have the desired effect,—*Journal Veterinary Science in India.*

SCARLET FEVER IN CANARIES.—*British Medical Journal* reports cases of scarlet fever in canary birds, four of which were fed with bread mixed with the disquamations from a child having the disease. All four birds became ill; three recovered in two days, but the fourth, which ate with especial greed, was very sick, its skin being bright red, instead of the normally pale yellow color. It died. Dysphagic symptoms were observed.

THE FIRST AUTHENTIC CASE OF CONGENITAL TUBERCULOSIS.—For a long time it has been a question of earnest discussion whether intra-uterine, *i. e.*, congenital tuberculosis, ever occurred. For man, all the evidence thus far obtained, contradicts its occurrence in this form. Numerous cases of calves that seemed to indicate its possibility, but it has remained for our colleague and correspondent, Prof. Dr. Johne, of the Dresden Veterinary School, to give direct and authentic proof of the same. Johne is fast making a name in Europe as one of the leading pathologists, and ranks in Germany next to Koch in patho-mycology.

The case in point was a calf, eight months old, the mother of which was slaughtered, its lungs being found tuberculous to an excessive degree. Johne says, with regard to the microscopic examination of the diseased parts of the calf:

"The histological examination of the hardened tissues confirmed the existing views, so far as we are justified in speaking of a characteristic histological structure in tubercles, and the microscopical examination."

"All the nodes examined consisted of compact accumulations of round cellular elements of an epitheloid character. Towards the circumference of the noduli one could see numerous leucocytes, which became gradually less until they were entirely wanting in the healthy tissue enclosing the noduli. Numerous giant cells were present, and protoplesna-conglomerates in the large and very granular form, which is rather a peculiarity of bovine tuberculosis. The diseased parts were frequently calcified in places. The nodes were seated in the peri-bronchial tissues in the lungs, giving a typical picture of peri-bronchitis nodosa; in the liver they were to be seen in the interlobular tissue."

"The characteristic tubercle bacilli were well represented in the giant cells and in the tissues of individual noduli in the limits of the caseous elements, in the intermediate tissue before the caseous passed into the epitheliod elements of the tubercles. In the last-named elements no bacilli were to be found.

"The presence of the bacilli in the noduli proved their genuine tuberculous character, and that this case is the first known one of undoubted fœtal tuberculosis."

To the extinction of the bacilli Johne found the method recommended by Neelsen, and endorsed by Koch, superior to the ordinary aniline-oil combinations.

Directions.—1.00 (gramme one) of fuchsin is to be dissolved in 100.00 (grammes 100.) of an aquous 5 per cent. solution of carbolic acid, to which is to be added 10.00 (grammes 10.) of alcohol.

The tinction takes place rapidly and sharply. Sections of tissues are easily colored in 5 to 10 minutes.—*Fortschritte*, vol. 3, p. 198.

PERICARDITIS IN A HORSE.—Mr. Abraham read a paper on pericarditis in a horse, showing the specimen. The principle features were enormous hypertrophy and an extraordinarily extensive fibrinous exudation covering the whole pericardial surface. The normal weight of the horse's heart was six or seven pounds, but this specimen weighed twenty-one pounds. The notes of the case were taken by Mr. J. Kenny, V.S., under whose care the horse had been for pleuro-pneumonia, which had yielded to treatment. A week after the animal was brought back, with high pulse and friction sounds over the heart, subsequently becoming dull. At the *post-mortem* examination four gallons of yellow fluid was obtained from the pericardium. The hypertrophy of the heart was of long-standing and caused chiefly by the heavy work which the animal had to perform. The pericarditis appeared to be secondary to the pleuro-pneumonia. The immediate cause of death was the enormous pericardial effusion.

The President remarked that a chronic form of pericarditis, with effusion, had been observed by Cruveilhier, of Paris, who attributed it to over-work and the wearing out of the system. In the present case the question arose—Had the horse Bright's disease, and was the hypertrophy a result of sclerosis of the kidneys?

Mr. Collins said he had noticed in epidemics of influenza in horses that the disease principally attacked the serous membranes, and afterwards the pericardium. In 1856 the horses of the regiment to which he was attached at Manchester were decimated by an outbreak called influenza, and in every case the lungs and pleura were glued to the ribs.

Dr. Henry Kennedy remarked that there was in the museum à specimen of pericarditis in the cow.—*Dublin Medical and Surgical Journal.*

FOOT AND MOUTH DISEASE TRANSMITTED TO HUMAN BEINGS.—A German veterinarian constituted the existence of this disease in a herd of cattle on Jan. 9, 1883. Two days after he was called upon to ride quite a distance, the day being very cold and windy. He took the *same* handkerchief from his pocket to tie over his mouth that he had used on the day he inspected the cattle. In a few days he had a manifest attack of aphthous eruption, accompanied by fever and other constitutional disturbances. The attack lasted eight days. A 4-month's old child was fed with uncooked milk from a cow having the foot and mouth disease, and had an aphthous eruption in the mouth; two others suffered with acute diarrhœa, the disease lasting fourteen days. Two butchers caught the disease from slaughtering swine suffering therefrom.—*Fortschritte*, 1885, p. 301.

CONTAGIOUS PLEURO-PNEUMONIA.—This disease is still reported as existing in Kentucky and Missouri, notwithstanding that the authorities supposed that it was entirely stamped out in the west, It must be distinctly understood that the fault does not lie so much with the Bureau of Animal Industry as with the Legislatures of the different States in which no appropriate laws exist, and where the ignorant doctrine of State rights comes into direct collusion with the efforts of the Washington authorities.

Unless more active measures be taken and successfully carried out than has as yet been the case this bovine pest will extend to the range cattle, and then we can say good-bye to all attempts at getting rid of it. We are doing our best to nationalize it at present.

BORAX-METHYLENBLUE AS A TINCTION IN THE STUDY OF THE ELEMENTS OF THE CENTRAL NERVOUS SYSTEM, AS WELL AS THE COLORING OF

Bacteria.—The addition of borax to a solution of methylenblue increases its coloring ability. The following have been found to be an appropriate mixture:

Distilled waters	40·00
Saturated aquous solution of methylenblue	24·00
5 per cent. borax solution	16·00

Let it stand a few days and filter.

Sections to be placed in the above for from ten minutes to some hours, become dark blue in color; wash in water and alcohol until the grey substance becomes clear white, the white remains blue in color; treat *lege artis* and mount in Canada balsam. The latter must be softened with turpentine or benzole for all specimens colored with the anilines.

This preparation is only suitable for immediate examinations, as the color is not permanent.—*Fortschritte*, 1885, p. 280.

Preventive Inoculation of Pleuro-Pneumonia.—Certainly one of the most interesting historical and zoölogical facts recently unearthed by veterinary inquirers is one relating to the preventive inoculation of pleura-pneumonia by an African tribe. It is published in the *Annales de Médecine Véterinaire* of May, 1885. It appears that in 1880 the distinguished anthropologist and statician, Auatrefages, communicated to the Belgian Academy of Sciences the existence of a peculiar race of oxen in Senegambia, discovered by Dr. A. J. de Rochebrunne. This race, whose characters are fixed, is marked by a *third horn*, identical in its nature and mode of development with the frontal horns, but seated on the nasal region, where the bony elements, undergoing a sort of "functional osteoporosis" furnish a true core for it.

Now, it appears that since time immemorial, the Moors and other races of Senegambia have practiced preventive inoculation by plunging a knife or other instrument into the lungs of an animal, dead of epizootic pneumonia, and then "vaccinating" the herd on the nasal region. The development of the third horn at the spot of inoculation was supposed by Colin to be due in part at least to the local stimulation thus produced, but this theory is disregarded by the editors of the above-named journal. The latter conclude by saying: "The origin of the *bos triceros* will, without doubt, remain an enigma for a long time to come. But whatever it may turn out, the study of this race has made us acquainted with a process of preventive inoculation which indeed need not surprise us as being practiced by a people who from an equally distant period have been in the habit of inoculating healthy persons with the virus of those afflicted with small pox."

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Professor Bouley.—Some time ago a movement was started in Paris to commemorate the election of Prof. Bouley, the illustrious veterinarian, to the Presidency of the Académie des Sciences, of France—perhaps the highest scientific society or corporation in Europe—by presenting him with a gold medal of honor, specially struck for the occasion,—a replica of this in bronze to be given to each subscriber. This resolution having been duly notified to the veterinary profession, the call for subscriptions was readily responded to by veterinary surgeons in every part of the world, and the result was the collection of a sum ample for the oject in view. The medal was recently presented to M. Bouley by a deputation of veterinary surgeons, who waited upon him in Paris. The bronze copy has been forwarded to the subscribers, and from that now before us, there can be no doubt as to the appropriateness and artistic value of the medal, which has been designed by Roty. On the obverse is an excellent likeness of the first veterinarian who has occupied the exalted position of President of the Académie, and on the reverse is an allegorical group, designed to testify to the active and prominent part he has taken in introducing Pasteur's protective inoculation for certain deadly contagious diseases. This represents a human figure inoculating a sheep, and above is the motto, "ARTE NOVA PASTOR PECORUM CONTAGIA VINCIT, GRATUM OPUS AGRICOLIS." while words, "*Souvenir du* 26

Janvier, 1884," and the inscription, *Inspector-General des Eçoles Veterinaries, Commandeur de la Legion d'Honneur, Professeur au Museum—Les Eleves, Confrères. Les Amis,"*—the lower part having the figure of a coiled serpent, the head bent over a tablet on which it is inscribing. In the centre is a small space, in which the name of the subscriber is stamped. Altogether this souvenir of a great event is worthy of the occasion.—*Veterinary Journal.*

CANCER OF THE PENIS, WITH DOUBLE STRICTURE OF THE URETHRA AND DISEASE OF THE BLADDER.—J A. Miner, V.S., in the *Journal of Veterinary Science* in India, says a brown Australian gelding, about nine years old, was admitted in the hospital of the veterinary school. Lahore, on November 21st, 1884, suffering from what the owner described as warts on the penis, and had been treated for such by the salootree of a native cavalry regiment. The horse was very irritable, and it was impossible to examine the organ except when protruded in the act of passing urine. When admitted he was in very poor condition, and the coat was harsh and unthrifty; there was no difficulty in voiding urine, but it was passed frequently and in small quantities, about 2 to 4 ounces at a time, and was somewhat high-colored. The appetite was good. Attempts were made to examine the penis, but the horse was so irritable that they failed and, a complication, particularly about the bladder, was suspected. "The horse having shown slight pain on the 26th" the owner was communicated with, before casting the animal, and warned of the danger. *Carte blanche* having been given to do what was deemed necessary,' the horse was thrown on the 28th; the penis was found to be in a very dirty state, as he would not allow it to be dressed, and when drawn out it was discovered that. with the exception of about three inches, the whole of the glands and free portion was extensively diseased. There was a fungus growth on the glands, distorting the urethral canal in a downward and backward direction. There were a considerable number of hard nodules imbedded in the substance of the organ, some of which had ulcerated on the surface. When they were cut into they were indurated, but had not undergone calcereous degeneration, nor were any of the kunkers usually present in bursattee sores discovered. The superficial inguinal glands were slightly enlarged. The diseased portion of the penis was removed, and the remaining part being so difficult to get hold of, considerable trouble was experienced in tying the arteries. While the patient was under chloroform the catheter was passed, some little obstruction being met with, and a few ounces of urine were drawn off, followed by a small quantity of mucus. A common dressing of sweet and encalyptus oil, 1 to 4, and, as there was some irritability, 4 drachms of chloral hydrate was given every morning in the form of an electuary, with formalation to the loins and enemata, the wound on the penis being dressed with the encalyptus oil by means of a pad of tow on a stick whenever possible, as he would not allow the part to be handled. Urine was passed in larger quantities, as much as a pint at a time, and not so frequently. He was again cast on December 4th, and the parts examined; they were healthy and doing well, except that a small nodule had formed on the surface of the wound, at the orifice of the urethral canal, but as it did not interfere with the passage of the urine it was decided to leave it alone. He was again cast on the 10th and 17th, and the wound appeared to be going on well, except that the orifice of the prepuce had become somewhat constricted: on December 19th, at 5 P.M., the horse was reported to be in pain, and the free flow of the urine obstructed, only coming away in drops. As it was then too dark to operate until next morning, fomentations were applied to the loins with anodyne enemata, and the chloral hydrate electuary given, but with little effect. The next morning, the 20th, the horse was thrown, and the nodule at the orifice of the urethra removed. An attempt was made to pass the catheter and a sound, but they failed to penetrate more than three inches up the canal. A soft metallic wire, doubled and twisted into a loop, was passed about eight inches, but was then stopped. The lining membrane of the urethra was drawn out and fastened by sutures backwards, and when released from the hobbles urine came away in drops. No relief was obtained, the animal got rapidly worse, and on the morning of the 21st, as he was evidently sinking fast and in very great pain, he was destroyed. The *post mortem* made next day revealed a stricture in the urethra, about three inches from the cut, and extending about four inches, and again, about four inches further up, a second one obstructing the urethra for about six inches; both of these strictures were so tight that it was with difficulty that a small probe could be passed. On opening the pelvis the bladder was seen to be partly distended with urine. It was emptied, and laid open along the long diameter from the neck; the urine that escaped was thick in consistence and tinged of a brown-red color. The inner surface throughout was coated with a greenish-purple slimy sediment, which floated away when washed, the walls of the bladder were abnormally thickened, and the mucous membrane discolored, showing several large clots of blood extravasation, and straining of the tissues. The neck of the bladder was somewhat thickened.

ANTHRAX.—[The following experiment was made by Fred. Smith to determine the incubative period of anthrax, and also to prove whether the virus of the disease could be conveyed by means of the digestive canal, and through an unbroken mucous surface. These points, as will be seen, were as thoroughly elucidated as one experiment can render them, and the case is placed on record owing to its important practical bearings.]

An adult horse received in two balls at 11.30 P.M. on the first day of the month a quantity of serum removed from the abdominal cavity of a fatal case of anthrax. The greatest care was exercised to roll these balls up securely to prevent them from breaking in the mouth, and they were rapidly and satisfactorily given by a very expert man, without any breaking having occurred. The following day (second) the morning temperature was 100.4 degrees, mid-day 100 degrees, and evening temperature 100 degrees; fed well all day. Third day, morning temperature 100 degrees, mid-day 100 degrees, evening 99.6 degrees; fed all day. Fourth day, temperature in morning 99.4 degrees, mid-day 100 degrees, evening 100.4 degrees. The temperatures were taken each day at 8 A.M., 12 noon and 5 P.M. At 5 P.M. on the fourth day the temperature was, as stated above, 100.4 degrees; at 7 P.M. (two hours afterwards) he was noticed to be uneasy, lying down, respirations very quick, *and the temperature* was now 107 degrees; at 8 P.M., temperature 107.2 degrees, at 9 P.M., temperature 106, exhibiting signs of colic, pulse very quick and small, trembling at the knees, respirations very much increased, in fact there was no doubt that the disease had thoroughly laid hold of the system. The temperature remained at 106 degrees until 3 A.M. the next day (fifth), and during this time all the symptoms became more aggravated; the fæces which passed were most offensive, flatus was continually passed, he constantly sat on his chest, and stretched out his head, resting on the chin, groaning, trying to roll, and before 3 A.M. the throat commenced to swell. At 4 A.M. he was standing, but still in pain, temperature 105.4 degrees; 5 A.M. still standing, appeared easier, throat more swollen, slight amber-colored discharge from nostrils, pulse can hardly be felt, coughs occasionally; 6 A.M. temperature 104.6 degrees; at 7 A.M. appeared much easier, temperature as before, 10 A.M. temperature 105, dyspnœa so great that I performed tracheotomy; noon, temperature 105 degrees, copious discharge from nostrils, throat much larger, and every symptom aggravated. Died very hard at 4.30 P.M., temperature 105 degrees.

The *autopsy* revealed extensive lung, but very few intestinal lesions, in fact, along the course of the lymphatics of the double colon (the most favorite site of anthrax œdema) there was but the least sign of disease, which would have escaped the eye of one not familiar with abdominal anthrax. There was no effusion beneath the kidneys or along the small bowels and mesentery, but there was acute gastro-enteritis of the mucous membrane.

The period of incubation in this case was about *sixty-seven hours.*

I at one time thought that the throat and lung forms of anthrax were due to ærial infection, and that the abdominal cases arose from infecton by the digestive canal. The experiment proves the error of this view. Here is a case of infection by the digestive canal causing acute throat and chest lesions, whilst some of the most significant intestinal changes were entirely absent. —*Journal Vet. Science in India.*

Count Ercolani.

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ORIGINAL COMMUNICATIONS.

ART. XXII.—EULOGY ON COUNT ERCOLANI.*

BY ELMER R. REYNOLDS, M.D.,
Member of the Anthropological Society of Washington, Etc.

"*Hector's love in Lethe cannot die.*"—HOMER.

Giovanni Battiste Ercolani, Count of the Holy Roman Empire, a Knight pre-eminently "*sans peur et sans reproche,*" was born in the renowned etruscan city of Felsina, December 23d, 1817. His father, Count Paul Leone Ercolani, was an eminent jurist of Bologna. His mother, the Countess Rosa Alba Celestina Lisi, was a lady distinguished for her social and intellectual accomplishments.

The origin of the noble house of Ercolani—or Hercules—can be traced to the war-like days of the old Roman Empire. Since then the name has been borne by chevaliers, barons, counts and princes. The church also has been represented by this family whose members have borne high sacerdotal rank. Finally, the name of Ercolani is inscribed upon the charters and in the annals of every province in Italy, and always with renown.

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* Delivered before the Anthropological Society of Washington, May 19th, 1885.

Count Ercolani, of Bagna-Cavallo, the late distinguished scientist, entered the Royal University of Bologna at an early age. Here he soon graduated with uncommon honors. In 1836 he took his degree as Doctor of Medicine, and subsequently that of Doctor of Surgery and Veterinary Medicine. In 1837, while still in his twentieth year, he was appointed Assistant Professor of Anatomy and Veterinary Medicine, under the celebrated veterinarian, Antonio Alessandrini.

The first work of a practical nature that he undertook was the reorganization and enlargement of the Museum of Comparative Anatomy. This he lived to enrich by his systematic cooperation with kindred institutions in all quarters of the globe.

Although in those days a physician of the two schools of medicine, Count Ercolani declined to enter upon the practice of his profession, from which we may assume that these laborious studies had been undertaken for the purpose of aiding his investigations in the realm of natural history.

The first product of his biological research was published by the Bolognese Academy of Science, in 1842. This was his "Memoir on the Transmission of the Glanders from the Brute to the Human Family." This work, which had involved an immense amount of patient microscopic research, met with an immediate and cordial recognition, and led to the author's election as a member of many of the distinguished academies of Europe. During this period he also assisted in editing the "Medical Science Bulletin," and the "Annals of Natural Science," which were published under the supervision of Prof. Alessandrini.

Ercolani's numerous scientific investigations, and his original and profound deductions thereupon, were sufficient to rank him as a man of extraordinary genius, whose closer acquaintance and friendship were well worth seeking by the scientists of Europe. While his researches were chiefly of a biological nature, he nevertheless did not confine himself exclusively to this field, for his intimacy with such statesmen as Count Cavour and Marco Minghetti led him to embrace the study of Politico-Social Philosophy, a familiarity with which was of great importance to him during his subsequent Parliamentary career.

In 1843 he united himself in marriage with Miss Carlotta Sarti, of Bologna. Of this union two daughters were born, but one only reached the years of womanhood.

Previous to 1848, although conversant with the troubled and ever-shifting political affairs of the Peninsula, Ercolani had felt reluctant to identify himself with any issue that would withdraw his mind from his favorite pursuit; but, after Pius the IX. ascended the Papal throne, all religious scruples were cast aside, and thenceforth Ercolani boldly avowed his long dormant principles respecting the necessity for Italian unity, and more especially his utter hostility to foreign rule or interference. His active political career may be said to have commenced with the Austrian invasion of 1848. His service in any capacity whatever was now tendered to the general government, and in consequence his patriotism and special acquirements were recognized in his selection as Secretary of the Committee of Public Health which co-operated actively with the national party during that critical period.

Towards the end of 1848, he was transferred to Rome as Secretary to the Supreme Board of Public Health, whose duties he continued to discharge until 1849, when he was elected Member of the National Parliament. While serving as a member of the *Constituente Assembly* under the new Roman Republic, Ercolani directed his most earnest efforts towards the final unification of the several Italian provinces under the sway of one native king. That he was opposed to any form of government but a monarchy, and that his actions at this date were based upon the law of political expediency, is shown in a recent letter to me from Prince Camporeale, of Palermo, in which he says: "In the Roman Parliament (Constituente Assembly), Ercolani was strongly opposed to the establishment of the Republic, thinking that at this time it would have been pernicious (and so it was) to Italy. He showed great energy in opposing all the exaggerated proposals of the Mazzinian party. L. C. Farini, in his 'History of the Roman State,' praises him much. It is true that he took part in the defence of Rome from the first day the foreigners attacked the Republic. From this time Ercolani saw nothing but the necessity of saving the honor of the nation."

Immediate and harsh proscription followed upon the downfall of the new Latin Republic, and, as was to be expected, the name of Ercolani occupied a prominent place in the long list of those against whom vengence had been decreed. During this dangerous period, while monarchist and republican alike were seeking safety in the neutral states, Ercolani made his escape from Rome and sought refuge in the mountains of Bologna. Here he wandered about suffering the severest hardships from hunger and exposure in his efforts to elude the Papal *gendarmerie* who had been dispatched thither to affect his capture or death. In the winter of 1849 he succeeded in escaping from the mountains, and threw himself upon the protection of the Grand Duke of Tuscany. After residing for a time in Pistoia, he found it expedient to change his residence to Florence, where he was comforted by the presence of his family. It was while partaking of a brief repose in this city that he commenced his celebrated "Research Historic and Analytical on the Writers of the Veterinary Art."

His residence in Florence was rudely terminated by the action of the Papal Court, for, in the language of his eulogist, "It seemed intolerable that one who had combatted the majesty of the Pope, should find sanctuary in a neighboring Catholic state, and so strong was the remonstrance from Rome that the Grand Duke was compelled to expell the patriot from his territory on twenty-four hours notice."

Quitting Tuscany under the brief and unceremonious safeguard of the Grand Duke, Count Ercolani made his way northward into Piedmont, which was now the only place in the Peninsula where the Italian flag afforded protection. He arrived in Turin early in 1851, and here, in this palatial city, shadowed by the icy domes of the Alps, his fortune reached its most distressing and pathetic stage. As a mournful exile, resting under the all-powerful ban of the Church, with his lordly estates and all other earthly means sequestered, he was doomed to drink "the wormwood and the gall," and to learn in the most sorrowful manner

> "How hard it is to climb the stairs of others,
> And eat the salt of others on his bread."

This stringent condition of affairs may seem hard to understand, yet it should be borne in mind that many thousands of political refugees had claimed sanctuary in Turin, and among these, multitudes were without food or shelter, and, although the public and private benevolence of the city were taxed to their utmost limits, it was still a matter of very grave solicitude to relieve the most urgent cases as well as to furnish congenial employment for so vast and unforseen an increase in the civic population.

In these sombre hours the genius of Count Ercolani could not be ignored, for his eminent acquirements, and the adverse fortune which had driven him hither, gave him a two-fold claim upon the consideration of the patriotic Piedmontese, and were the means of obtaining for him the position of "substitute," or, Assistant Professor in the veterinary school of that city. Previous to this appointment, however, the citizenship of Piedmont had been conferred on him by a special decree of the king.

Count Ercolani now resumed his researches in natural history, which were directed chiefly towards the lower and more complex groups of animal life. These exhaustive and conscientious explorations into many of the slighted by-ways of nature, were the media of developing elaborate facts not hitherto recognized by the scientific world, and gave him a prestige in Italy similar to that won by Darwin among the Anglo-Saxon people. In 1852 he issued the first volume of his "Researches Historic and Analytical on the Writers of the Veterinary Art," the second and final volume of which was published in 1854. This was then, and is still, considered one of the most profound works of its scope ever issued in the south of Europe. During this period he also assisted in founding the first journal of veterinary medicine ever issued in Italy. In this work he was ably assisted by Prof. Carlo Lessoni, of Turin.

In 1855, during the cholera epidemic in Salluggio, Ercolani generously abandoned his professional duties and hastened into the infected district where he gave his whole attention to the relief of his fellow-countrymen until the disappearance of the disease. This, so far as I am informed, was the only instance in his career where he made a practical application of his knowledge of medicine.

In such profound respect was he now held by King Victor Emanuel that upon the reorganization of the educational establishments of Piedmont, Count Mamiani, the Minister of Public Instruction, was directed to promote him to the Directorship of the Veterinary School of Turin; thus advancing him from the lowest to the senior professorship. Contrary to the general rule, this flattering advancement met with the approbation, not only of the populace, but of the several faculties themselves.

In the winter of 1861 a sorrowful loss fell upon the now prosperous professor, and threatened for a time to deprive the world of his further career of usefulness. This event was the untimely death of his daughter Cæsarina, who suddenly yielded her life under an attack of parturition fever. The indescribable anguish and desolation which followed this bereavement induced Count Ercolani to resign his appointment, and, as political changes had at last removed the bar of expatriation, he resolved upon returning to his native city. In consequence, Turin lost her illustrious adopted son, and Ercolani once more set foot in Bologna after an exile of fourteen years.

Ercolani's resolution to retire from professional pursuits was of no avail, for upon arriving in his ancient home, the Minister of Public Instruction hastened to appoint him Professor of Pathological Anatomy in the Veterinary School of the Royal University. This appointment was followed by others which were both flattering and substantial. He was unanimously elected Rector of the Royal University, President of the Medico-Surgical Society, Permanent Secretary of the Academy of Sciences, Member of the Superior Council of Public Health, President of the Agrarian Society, Member of the Provincial Sanitary Commission of Bologna, and, for the second time, Member of the National Parliament, to which he was subsequently re-elected no less than three times. Among other important movements, he now proceeded to reorganize the School of Veterinary Medicine, which by the liberality of the Province and ample government grants, soon arose to be the first of its kind in Italy, and probably the most celebrated in the world. He also enlarged and greatly enriched the Anatomical Museum founded by Alessandrini, and, in addition he provided for a systematic and thorough course of Veterinary clinical lectures.

Ercolani may not have been the first to teach the doctrine, but he was the first to insist that a correct knowledge of Veterinary Medicine was as essential to the prosperity of the Kingdom, as that pertaining to human maladies. He strove to elevate and dignify this long neglected science, and finally succeeded in establishing a law which required candidates for veterinary honors to possess the same qualifications that were necessary to admit them into the regular universities in the Kingdom. Had he accomplished nothing else in life, this alone would have marked his grave for ages. In bearing witness to Ercolani's literary productions, it is enough to say that he was the author of no less than one hundred and thirty-six distinct memoirs embracing anthropology, biology medicine, and a vast acquaintance with other lofty subjects. Now, when it is considered that many of these productions fill large quarto volumes overflowing with original discoveries and deductions, we are permitted to form an opinion as to the unbounded resources and ceaseless industry of his mind. To specialize a few of his acquirements, it is stated that "He was a decided microscopist * * * and a passionate follower of both Medicine and Surgery, as well as of Natural History; as shown by his numerous discoveries in the fields of normal and pathological histology; of comparative tetratology; of elmintology; and of pathological anatomy and embryology." His numerous discoveries were not presented to the world until they had been subjected to the most penetrating experiments and comparisons known to modern science; then if his deductions were combatted, he sustained them with the same intellectual vigor that had characterized their patient and laborious production. An illustration of this nature is shown in his learned controversy with the celebrated Professor Kölliker of Wurzburg, Bavaria. On the contrary, however, if any of his theories were shown to be at variance or contrary to more recently discovered facts, or logical hypothesis, he yielded at once in the most graceful and liberal manner. An instance of this character is referred to by him in one of his letters to his distinguished American translator and correspondent, Dr. Henry O. Marcy, of Boston. In this communication he states that certain objections of Professors Albini, Pallidini, and Ohel, had been of decided advantage, inasmuch as they stimulated him to undertake supplementary investigations which developed valuable and previously unsuspected features in embryonic life.

Ercolani was equally as loyal to the rights of other authors from whom, in his personal judgement, the full credit of prior discovery had been withheld. This fact is shown in one of his memoirs wherein he "avenges" to Senator Carlo Ruini, of Bologna, the honor of having been the first to discover the circulation of the blood. "Noteworthy among his many works," says Prof. Cocconi, "are his patient '*Researches on the Genetic History of the Trematodic Worms, and the Adaptation of their Species to the Surrounding Fluid*,' in which is shown his great skill as an observer and naturalist. "'*The Formative Process of the Osseous Callus in the Different Fractures of the Bones of Men and Animals;*' '*The Interior Structure of the Tendinous Tissues, and that of Fibrous Tissues;*' '*The Transformation of the Histological Element in the Animal Organism;*' and other works on minute anatomy, attest his skill as a Histologist. But the work that obtained most attention from the scientists of both continents consisted of a series of memoirs regarding '*The Intimate Structure of the Placenta in Woman Compared with that of other Animals.*' In these observations he was led to determine the unity of the anatomical type, and the nutritive functions of the fœtus in all the vertebrates." It was the latter work which led to Ercolani's controversy with Prof. Kölliker, the results of which form an entire volume of new facts and masterly deductions which might have remained dormant had not the antagonism of the great German anatomist drawn them into existence.

As to the value of these discoveries, as well as to a brief statement respecting Ercolani's rank as a scientist, I take the liberty of quoting from Dr. Marcy, to whose discrimination the professional men of England and America are principally indebted for their knowledge of this author's ripest production. "The opinions, at a greater or less length, of this distinguished scientist, are quoted in nearly all the modern text-books on the subject, and yet so indifferently in many instances, and even erroneously, that it is evident that authors have not familiarized themselves with the elaborate and painstaking efforts of Professor Ercolani. * * * So simple are these demonstrations and the truths derived therefrom; so radically different are his teachings from the time-honored views still held and so generally taught, that I have felt the medical profession and students of natural history would gladly avail themselves of the opportunity of carefully examining these original investigations. Especially have they seemed to me valuable because of the attention which the study of the human placenta has received of late by many careful observers, and still more so since their conclusions are by no means unanimous. * * * By these researches is opened an almost unexplored field in the pathology of gestation, this, too, is essentially the medical and more practical side of the subject. In the abnormal development of the placenta, and in the modification of the nutrition of the fœtus, will be found causes hitherto unknown of embryonic disease and arrest of intra-uterine gestation. Therefore it will be seen that the work of the Bolognese Professor has an intimate connection and bearing upon anatomy and physiology, chemistry and pathology, embryology and anthropology, biology and obstetrics. It destroys ancient and classic errors; it demonstrates an important new anatomical fact; it teaches a new physiological function, and clearly shows a simple and fundamental plan of embryonic life· The evident impartiality of the author, as shown in his numerous observations, the multiplicity of facts produced, the modest and conscientious expression of opinion, * * * appeal to the unprejudiced reader, and carry conviction that the deductions presented are the results of thoughtful labor, and not preconceived theories which he has endeavored to demonstrate. The establishment of such facts will cause the name of Ercolani to be classed with the great benefactors of science and be handed down to coming generations, honored alike with Eustachius, Malpighi, Morgagni, and other distinguished anatomists of the early Italian School."

Reference has already been made to some of the high offices to which Count Ercolani was elected by his admiring countrymen. These however were not all the compliments which were bestowed upon him, for a man of such supreme abilities could not be overlooked by those in authority; hence we find that he was frequently called to Rome to confer with the Royal Government for the purpose of organizing or perfecting plans of national utility, which only men of his judgement and superior training could successfully undertake. "He was selected as a Member of the Royal Commission for the Publication of the Classics in the Province of Emilia; and all the Universities of the Kingdom, without distinction between medical and veterinary twice chose him as their representative in the Supreme Council of Public Instruction."

That King Victor Emanuel fully appreciated Ercolani's patriotism and his devotion to the literary advancement of the Kingdom is shown by the gracious advancement of the latter to the several distinguished orders of Knighthood. He was created Chevalier of the Royal Order of Civil Merit of Savoy, Commander of the Royal Maurizian Order, and Knight of the Crown of Italy. "Ercolani was worthy of all these honors," says Prof. Cocconi. "He did not seek them, nature having constituted him modest and disinterested. In manner he was affable towards all, and especially so with the young. He was not rigidly bound to routine, although he was scrupulous in the observation of his own professional duties. He was beloved by the youth whom he had as pupils for more than thirty years. He was cordial with friends and inferiors, and strove for the greatest advantage of all without slighting the interests of any."

Somewhere in one of Count Ercolani's works I remember having seen a passage to the effect that "The laborious conquests of human learning are never lost." This simple but pertinent expression has been verified abundantly by the mutations of three thousand years, and seem particularly applicable to this author's sublime life and works. It may transpire, however, that some of his works will not survive intact. New discoveries in the same boundless field may modify certain of his brilliant hypotheses, and, moreover, it may be shown that some particular features of his research lack elements now unsuspected, but, nevertheless, essential to their ultimate harmonious adjustment; or perhaps some of his masterly deductions may prove to be too free a rendition of what he undertook to interpret from the marvellous cryptology of nature. All these considerations will be "weighed in the balance," and Time will do him no injustice, but will touch these labors with a gentle hand, even as a harper stretches his open palm upon the quivering wires to modify their melodius cadence. Finally, it seems that Ercolani's works are both worthy and certain of earthly immortality, for so far as human wisdom goes, he builded in accordance with immutable laws.

A study of Ercolani's life, from the abundant memoirs, manuscript material and letters at my command, discloses that the most potent factors in his character were his abiding love and true-hearted sympathy for humanity. He was a nobleman, so born under the decree of a by-gone Pontiff; yet *noble* he was even without ancestral rank, for so he came fresh from the hand of God, and so he lived through a brilliant, but somewhat sorrowful life. All he claimed or aimed to be was simply a man, and with men he strove for his daily bread. Hence his works and noble brotherhood are the inheritance of a common humanity, and not of one country or one time, for neither political boundaries nor the unseen walls of different speech can circumscribe his fame, which, like the winds and the waves, gathers renewed vigor as it passes onward within the influence of alien zones until it finally reaches the "four corners of the world" and then—

> "The echoes roll from soul to soul,
> And grow forever and forever."

1817 to 1883:—A long, active, and highly honorable pilgrimage for Count Giovanni Battiste Ercolani. But now the great and solemn time was drawing nigh, for at the dawning of the year a treacherous malady (Epithelioma) had seized upon his system, and "the gentle science to whom nearly three-score years had been devoted, was now powerless to relieve her loving disciple." The last work of his life was completed during the few months that preceded the end. This is now before you in the form of his letters to Prof. Kölliker.

As Ercolani's first undertaking had been for the benefit of the world, so even was his final act, for his splendid library of manuscripts, codices, and rare editions—a fortune in itself—was modestly bestowed upon the city of his birth.

During his final illness he had on several occasions expressed a desire to be buried without unnecessary ceremony and expense, and, as the subject was taken up by the daily journals, he requested his nephew to communicate his wish to the Mayor, but the latter, mindful of Ercolani's worth replied:—"Bologna must do her duty, and I cannot prevent the Bolognese from showing the honor due to her illustrious citizen."

"It was heart-breaking," says Prof. Cocconi, "to witness the terrible suffering that preceded poor Ercolani's mortal overthrow, and which he endured with such heroic resignation."

Thus it fell that on the 16th of November, 1883, at the ripe age of sixty-four years, the gifted son of Leone and Lisi Ercolani paid the great debt of nature.

So ended "*The Labors of Hercules.*"

ART. XXIII.—ACUTE PARENCHYMATOUS NEPHRITIS.

HÆMOGLOBINURIA–TOXICA. BOLLINGER. AZOTUREA. WILLIAMS.

BY A. W. CLEMENT, V.S.,
MONTREAL VETERINARY COLLEGE.

Probably there is no disease met with in veterinary practice concerning which there are so many conflicting opinions as to the lesions and the genesis of those lesions, as in that affection usually described under the heading of Hæmoglobinuria.

A few consider the primary lesions to be located in the kidneys, while the majority, though admitting structural changes in those organs, look for the primary changes in the blood itself, and maintain that only through the irritating influence of this poison do the kidneys become involved.

Certainly the fact that changes of a like character to those found in the kidney are found in the liver and certain muscles, together with the very violent symptoms, would lead us to suppose that an intense irritant existed in the blood, but might not this be a consequence of structural changes in the kidney? Would not an attack of acute parenchymatous nephritis with uraemic poisoning bring on similar conditions which would be manifested by much the same symptoms? I think it would.

I can not agree with those who affirm that red blood corpuscles are very rarely to be found in the urine in this disease, and I make this statement not altogether on my own authority, for my attention was first called to their presence in the urine by Dr. Osler some three years since. I remember the case in point very well. The urine was dark and quite ammoniacal. A few well defined corpuscles could be seen, while many more, which were decolorized and more or less degenerated, could be made out by close observation, as well as hyaline casts and degenerated renal epithelium. The post-mortem examination proved the correctness of this observation, for, while the kidneys were dark and swollen, points of hæmorrhage could be seen here and there in the cortex, and examination of hardened sections with a No. 7 Hartnack showed ruptured capillaries with extravasation into the interstitial tissue, in some places completely plugging the tubules. The red corpuscles were very well defined. Since then I have seen these degenerated corpuscles several times in the urine, though not in every case, and have seldom failed to find the distended capillaries and extravasation of blood in the tissues.

It is not at all strange that the corpuscles should appear so much better defined in the kidney than in the urine if we accept the statement of most writers on such subjects, for nearly all agree with Roberts, who, in his work on Urinary and Renal diseases article on Hæmaturia, says that "The corpuscles quickly disappear if the urine be of a low specific gravity or ammoniacal." That the urine is ammoniacal in this disease is very well known, and when we consider that while the flow into the bladder is continuous, the outflow is periodical, and in most of these cases dependent upon surgical interference, is it not possible that we are dealing with a Hæmaturia, and that only after its entrance into the bladder does it become a hæmoglobin urea.

If Franck, whom Mr. Billings quotes in his article on Hæmoglobinuria-toxica, has demonstrated beyond a doubt that the urine has no solvent action on hæmoglobin in the corpuscle, obviously no such change could have occurred in the bladder; but his statement does not agree with any which I have seen, and is not, in my opinion, borne out by experimental evidence.

If, on the other hand, our observations were correct, if degenerated corpuscles were seen in the urine in a given case, and if, on the microscopical examination of sections of the kidney in the same case, we found congestion, rupture, extravasation, and plugging of the tubules with blood casts, and that in the organ the corpuscles were much better defined and of a more natural color, it is evident that we have a condition resembling hæmaturea rather than hæmoglobinuria.

If, in addition to this we found the parenchyma degenerated, and in some cases an increased amount of connective tissue, we may conclude that we have to deal with acute hæmorrhagic nephritis.

Case No. I.—A gelding, of about 1,400 lbs. weight, used to hard work, but very well cared for and highly fed, remained idle for two days. On the third day he was put to his regular work, but when about half a mile from the stable the usual symptoms came on. After staggering for about a rod he fell and was unable to rise. He was removed to the stable on a truck. It was nearly an hour before surgical assistance arrived. Then about two quarts of very dark colored urine, having a very ammoniacal odor, was taken from him. Tested with Nitric Acid, a dense precipitate was thrown down, which, examined microscopically, was found to be composed in large part of nitrate of urea. Specimens of the urine as drawn from the bladder were found to contain degenerated renal epithelium but no blood cells, though many coarse granules and degenerated bladder epithelial cells were found

AUTOPSY—Made four hours after death.—All the organs dark in color. Kidneys swollen and soft, capsule easily removed. On section the substance of the organ had a clouded appearance, with here and there in the cortex small points of hæmorrhage. Bladder nearly empty, and the mucous membrane very dark in color. Considerable infiltration of the connective tissue, especially about the kidneys. Liver somewhat enlarged and fatty. Spleen engorged. Intestine comparatively pale. Lungs dark in color, but crepitant throughout. No accumulation of mucous in the bronchial tubes. Structure of the heart normal. Left chambers empty; right chambers full of blood which was only partially coagulated. Usual appearance of the muscles of the haunch and thigh. The striæ completely obliterated in some of the fibres, while others were comparatively normal. A finely granular material took the place of the striæ where the sarus elements were wanting.

Sections of kidney, which had been hardened in Mueller's fluid, and stained with hæmotoxyline, when examined, showed great engorgement of the capillaries and extravasation of red blood corpuscles into the interstitial tissue, which was somewhat increased, and in which many nuclei could be plainly seen In some places the cells being so much swollen as to entirely fill up the lumen, while in others the lumen was plugged with finely granular casts, in some of which red blood corpuscles could be seen indicated the existence of acute parenchymatous degeneration.

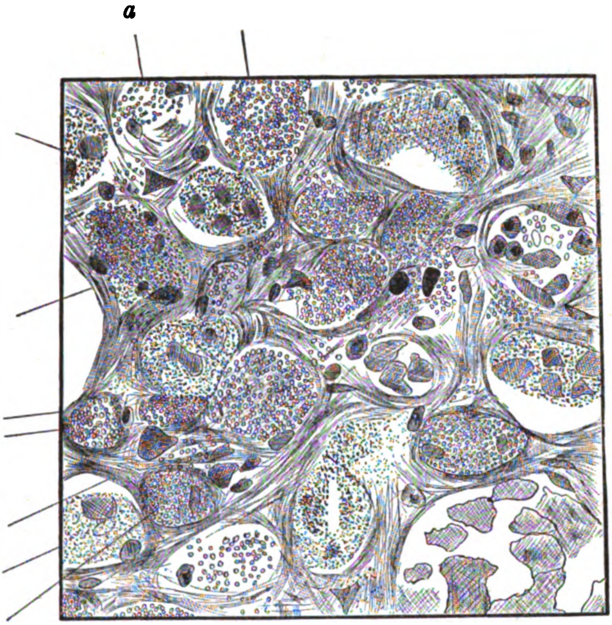


FIG. I.—*a*. Showing tubule with blood casts and a few free epithelial cells.

Diseased portions of the liver showed the cells to be extremely granular, so much so as to obliterate the nuclei in some places. The duration of the malady was six hours.

CASE NO. II.—Nothing special about the history. The duration of the malady was three days. Urine very dark from the first. Microscopic examination showed hyaline and blood casts, with some degenerated free red blood corpuscles.

The interstitial tissue was more hypertrophied than in Case No. 1, and the nuclei were more numerous, so that in some places it pressed upon the tubules, lessening the calibre of their lumena.

Parenchyma swollen and very granular, completely obliterating the nuclei of many of the cells. In some of the tubules the cells were so swollen as to completely fill the tubule with one mass of granulous protoplasm in which no traces of nuclei could be seen, while in others the cells were better defined and the lumen plugged with blood casts. There was great distention of the capillaries, with rupture of arterioles in one or two places, the nuclei in the muscular layer of the wall showing very distinctly.

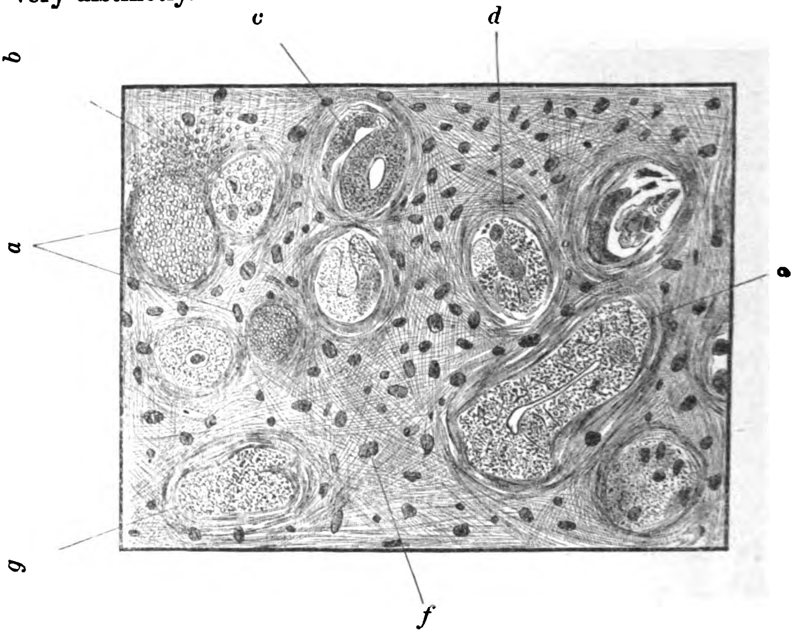


FIG. 2.—*a*. Blood vessels greatly distended. *b*. Uriniferous tubule filled with blood casts, and few free epithelial cells. *c*. Epithelium very granular. No nuclei present; outline of cells not apparent. *d*. Epithelium swollen and granular; lumen filled with what appears to be a blood cast. *e*. Epithelium very cloudy; nuclei in places disintegrated; lumen nearly closed. *f*. Nuclei of the hypertrophied interstitial tissues. *g*. Complete occlusion of tube by swollen disintegrated epithelium.

CASE NO. III.—The subject in this case was a Bay Gelding of about 1,300 lbs. weight, used to working in an express wagon. The owner intended to sell him and for the past few weeks had given him an extra quantity of food. He remained in the stable for two days, and on the third day was attacked soon after leaving the stable. He was catheterized about two hours later and a quantity of very dark colored urine came away. When examined some three hours later nothing but granule masses could be seen, no blood corpuscles could be detected, nor could any cylinders be seen.

AUTOPSY—Four hours after death.—On the skin being removed the usual streaked appearance of the gluteals could be well seen. All the internal organs were dark in color.

Kidneys soft and swollen. On removing the capsule small pieces of the substance came away with it. On section the usual cloudy appearance was met with.

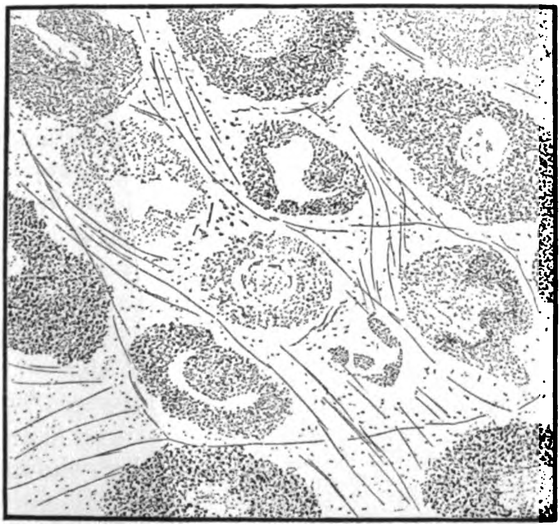
As in cases I and II points of hæmorrhage could be seen in the cortex, but the rest of the cortical portion seemed more anæmic than in the other cases. The tubules stood out very prominently.

The liver softer than normal and fatty. There was great œdema of the connective tissues of the body. The meninges in the lumbar region of the cord greatly congested.

Microscopic examination of the kidneys showed no capillary congestion. No blood vessels to be seen in this section. The cells of the tubules were so degenerated as to be unrecognizable as such, and in their place was one continuous mass of granular protoplasm with which some of the tubules were completely filled while in others this granular mass was a little less condensed in the center, so that the outline of the lumen could be made out.

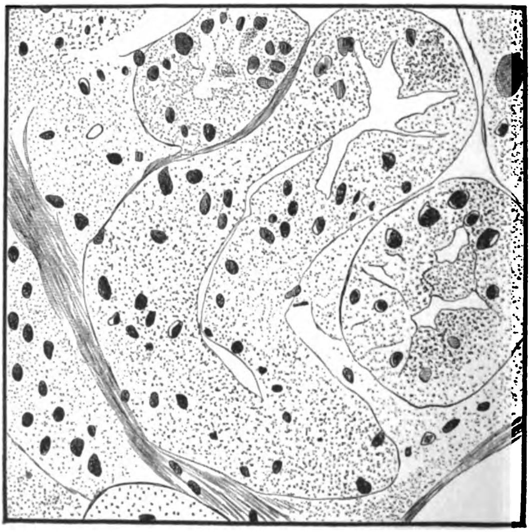
As will be seen by the accompanying drawing there was considerable difference in the density of the granular masses in the different tubules, some were quite dark, while others were much lighter.

The fibres of the interstitial tissue were on the stretch, leaving considerable spaces between them, which were more or less studed with granules.



Case No. IV.—Dark Brown Gelding 1,600 lbs. weight. The point of interest in the clinical history of this case is, that though the paralytic symptoms were very marked from the onset, yet, though two hours had elapsed, when the urine was drawn from the bladder it was perfectly clear and nearly neutral in reaction ; and when the catheter, was again passed some three hours later, a small amount of but slightly tinged urine was obtained, in which microscopically a few red corpuscles could be seen. Nitric acid threw down a slight blood floculent precipitate which did not disappear on boiling. At the third catheterization, however, the urine was very dark, had a strong ammoniacal odor and contained some much degenerated corpuscles and granular masses but no cylinders. In this case the urine remained normal in color for at least two hours, yet the paralysis was so complete that the animal from the very commencement of the attack had no power whatever in the hind quarters. He would strike out wildly with the fore limbs, but the hind legs remained perfectly motionless.

AUTOPSY—Made two hours after death.—Kidneys swollen and soft. On section, points of hæmorrhage were to be seen here and there, while the remaining parenchyma was quite anæmic. The tubules were very distinct. Bladder empty. Liver quite firm, but a little fatty. Excessive œdema of the connective tissue and of the muscles, especially the gluteals. Congestion of the spinal meninges, especially in the posterior dorsal and lumbar regions. On microscopic examination of the kidneys in hardened sections, the only lesions seen were in the greatly swollen and extremely granulous condition of the tubal epithelium, completely filling many of the tubes with one mass of granular protoplasm with nuclei scattered here and there, and a somewhat hypertrophied condition of the interstitial tissue in places, while in others the tubes were so distended as to press upon each other with no recognizable intervening tissue. The anæmic muscle fibers showed the usual granular deposit in place of the striæ.



CONCLUSIONS.

I.—That the lesions in the kidneys are identical with those of acute nephritis in man.

II.—That the secreting power of the cells had become gradually diminished from over stimulation due to a hyper-nitrogenous condition of the blood.

III.—That some excitant, such as cold or exercise after a period of quiet, gave rise to an increased flow of blood to the already overworked organ, thereby causing a complete suppression of secretion, with consequent exudation and hæmorrhage followed by uræmic poisoning.

IV.—That inasmuch as degenerated red blood corpuscles are found in the urine, and quite well defined ones are to be found in the blood vessels and tubules, it is not hæmoglobin-uria, which is secreted by the kidneys but rather is it hæmaturea, which under the influence of the alkaline urine in the bladder is there converted into hæmoglobin-uria.

V.—That with our present lack of information concerning the microscopic appearances of the cord, in these cases, we would not be justified in offering an opinion as to the cause of the paralysis.

NOTE.—The drawings were kindly made by MR. J. H. Y. GRANT, medical student, McGill College.

ART. XXIV.—CLINICAL ASPECT OF SOME DISORDERS OF THE GASTRO INTESTINAL TRACT OF THE HORSE.*

BY THOMAS B. ROGERS, V.S.

I wish to call your attention this evening to some diseases of the digestive tract of the horse—diseases acute in character and often fatal in termination. Endowed with a lengthy, vascular and highly sensitive alimentary canal, compelled to travel at speed, when he should be digesting at leisure a meal of well masticated food, watered when the fluid should be withheld, or deprived of water when it would aid digestion, there is small wonder that "colic" in the horse occupies an analogous position to the diseases of the respiratory apparatus in man as the great factor in the bills of mortality. I shall not inflict upon you a detailed treatise on these conditions, and shall make but little reference to the pathological changes involved, feeling that I am not at all competent to present them at first-hand, and knowing that a réchauffé of the observations of others would have small interest for you.

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* Read before the Keystone Vet. Med. Association of Philadelphia, Aug. 13th, '85.

Causation.—The causes of acute digestive troubles in the horse are varied: improper food, sweet potatoes, new wheat, new corn (some of the most violent cases I have seen were caused by feeding new wheat to horses working in threshing machines), improperly cured food, musty hay, mildewed grain, hay burnt or heated. Food given at improper times or in improper quantities. Speeding a horse immediately after a meal, or the fear and excitement incident to the abuse of a brutal driver may stop digestion. Irregularities of the teeth, bolting the food, cribbing, diseases of the parotids interfering with the secretion of saliva, paresis of the muscular coat of the bowel, the presence of a calculus or stenosis of the canal are all in casual relation to acute digestive troubles.

Symptoms.—Pain is common to all of them, varying in intensity from slight uneasiness to violent torment—the intensity of the pain is usually in inverse ratio to the gravity of the disorder. The more persistent the pain, whatever be its grade the graver the outlook. The conditions grouped as "colic" are mostly marked by intermissions, or at least remissions of the pain, the pain of colic induced by hepatic derangements where we often have localized peritonitis is the most persistent. The urine is usually retained (in the colicky symptoms preceeding rheumatic influenza there is often suppression), either from spasm of the sphincter vesical or from the preliminary straddling, causing pain. The rectal contents may be drier than normal, may be balled, fluid, or semi-fluid in consistence —they are usually ill smelling—the mucous membrane dry, its secretion suspended, or more than the natural quantity of rectal mucus may be found. The belly may be distended from evolved gases—this is not very observable if confined to the stomach or small intestines, but is readily noticed when the colon or cæcum are distended. Sweating is often seen if it is warm, and breaks out on the parts where it is first observed; on exercise it is of little moment; if cold and localized it usually indicates mechanical trouble beneath its seat; if cold and diffuse it is too often the forerunner of death. Nothing is more common than to hear a practitioner assert that a patient had colic, that the colic was followed by enteritis and death; the autopsy showing acute intestinal imflammation, all this taking place in about twelve hours. It is entirely fair here to assume one of two things—either a mistake in the original diagnosis, or an incorrect reading of the pathological conditions observed on post mortem. The symptoms of enteritis are elevated temperature, hot dry skin, pain not well marked, constipation often followed by diarrhœa, mucous or croupous discharges per anum, scanty and high-colored urine; the horse is dull, the pulse quick, soft and compressible; he is uneasy but not violent; he gets up and down carefully, and often stands in one position for many hours, and is sicker than he looks. The colicky horse exhibits a violence unseen in enteritis. His full, strong pulse shows his heart's action unimpaired; his temperature is not elevated; *rectal examination gives the colicky horse relief; in enteritis it gives pain.* The pain of colic is rapidly relieved by opiates, and with relief comes the desire for food; the relief afforded by opiates in enteritis is but partial, and is accompanied by no desire to eat. But, you say, what about the post mortem appearances? Just this! Part of the discoloration is due to post mortem staining and hypostatic congestion, part of it to ante mortem congestion and extravasation from the compressed vessels; acute inflammatory troubles don't run their course from start to finish in a few hours. Another point—the first symptoms of colic are rarely seen in the early morning hours; it is rare that a horse eats his breakfast with a relish, and is attacked with colic before noon. I do not recollect ever being called to a case commencing before noon. This is my experience, it may differ from yours, I give it for what it is worth. In peritonitis there is pain on pressure, and on rectal examination a quick wiry pulse, elevated temperature, *thoracic respiration, the flank muscles outlined and fixed,* and the fæcies hippocratica is as marked in the horse as in man; the eyes look sunken as if from absorption of their fatty cushion, and as the disease goes on there is œdema of the sheath, mammae and belly often extending between the front legs. I think its degree indicates the gravity of the disorder. You will find in your text books that great stress is laid on the acuteness of the pain, especially on pressure. I recently had the opportunity of watching a case of diffuse peritonitis (following the operation for strangulated scrotal hernia) from its commencement to its termination. At no time was the pain marked, at no time was it much augmented by pressure; the temperature stood from 103°-104° F. for several days; the horse ate fairly well until the last two days of life; he moved about freely and did not arch the back; the excretæ (rectal) were natural for some days; then, thickly coated with mucus (extension of the inflammation to the mucosa through contiguity?) the skin was pleasant to the touch; the temperature of the extremeties irregular; the pulse intermitted; the œdema was very great and progressive. Fortunately acute idiopathic peritonitis is very rare in the horse.

The colicky pain accompanying liver trouble is somewhat acute. Almost persistent the horse lies on his right side or back quietly, and takes good care of himself; the fæces are balled and clay colored, coated with mucus or semi-fluid, and tarry; the pulse is *slow and full;* the mucous membranes icteric or pale; the appetite not altogether lost; the urine high colored and scanty. In these cases the pain evinced on percussion over the lumbar insertion of the diaphragm is a valuable symptom; it is not present in ordinary colic, it has never been absent in the colic due to liver derangement in my experience. It must be remembered that rupture of the stomach may complicate colic, it may be present when the veterinarian is called in, it may occur during treatment, and it is important to the practitioner's reputation that its presence should be detected. I was taught that vomiting rarely occurred in the horse save from ruptured stomach or aconite poisoning. Vomiting is certainly rare in the horse. I think I have seen four cases. They all got well. One sat on his hind legs like a dog, and vomited very freely, and I do not see how a horse can vomit when the contents of the stomach have escaped into the peritoneal cavity.

Substitute retching for vomiting, evident nausea, the ejection at intervals, of saliva and mucus, add to this the fæcies grippe, and a quick, weak thready pulse and you have a train of symptoms absolutely diagnostic of ruptured stomach. I do not say the gentlemen who have made a diagnosis of ruptured stomach from the occurrence of vomiting have mistaken post for ante mortem rupture, but I do insist that the rupture had not taken place when the vomiting occurred. I saw five cases last summer, diagnosed the condition, and verified it by an autopsy, and it is very instructive to observe how rapidly false membranes form around the seat of the rupture. Death takes place in twelve to twenty-four hours—its cause is probably shock.

Intussusception may be primary or occur in the course of an attack of acute indigestion, the pain is constant, there is straining, fæces back of the obstruction are passed, opiates fail of full relief, there is great anxiety and uneasiness and after a while a symptom of great diagnostic value will usually be observed, the presence in the recturn of bloody mucus due to extravasation from the compressed vessels. The prognosis in these cases is grave, though they are not absolutely fatal. I saw a case when in college where a foot of gut sloughed off and was discharged per anum, the horse making a good recovery. Again the parts may assume their natural position without our interference, through the altered pressure relations caused by distention of the bowel with gas, or conversely, its puncture. I relieved a case where I am as well satisfied that I had intussusception, as a man can be of anything he cannot see, by the use of the trocar.

In twisting of the gut the pain is intense, peritonitis follows, the parts swell, compression gives nerve pain, cold sweats occur over the part, the horse often walks a circle presistently, and if laying down assumes the dorsal decubitus, the pulse grows weak and thready, the extremities cold, the pain increases, is agonizing, unbearable, it stops suddenly, the breath is cold or fœted, the surface temperature runs down, and mortification has set in. The horse may now eat a little, and I saw a case where with a delirious neigh an animal fell back dead with a wisp of hay in his mouth. Not infrequently an attack of rheumatic influenza is ushered in by colicky pains and these cases are at first somewhat difficult of diagnosis. In engorgement the pain is not very marked. If the stomach is the seat there may be vomiting or spasmodic movements of the muscles of the neck showing nausea, the horse is full and sleepy and often rests his head on the manger. In engorgement of the small intestine relief is apparently afforded by backing up against a wall or fence, the intestinal murmur is lost, the temperature a little elevated, the muscles of the face somewhat drawn. I recently saw three cases closely simulating the "stomach staggers" of the old writers due to feeding freshly cut forage containing large quantities of "wild carrot," the pupils were dilated, the skin hot and dry, and the mental faculties evidently affected.

The presence of calculus gives rise to similar symptoms of mechanical obstruction as in engorgement or intussusception. Rarely its presence may be detected by manual examination, more rarely still it is voided per rectum.

Treatment.—No fixed rules can be laid down for the treatment of these cases, the routine practitioner must necessarily lose a good many of them. Factions have rallied alike around the sedative and purgative lines of treatment; the treatment must be adapted to the case. It is no use to stand over a horse and philosophise about the use of opium, while he is beating out his brains in the acuteness of his agony. He would die before a purge acted. On the other hand, if the pain is not acute or inflammatory, even if it persists for hours, the judicious practitioner will watch it and await the action of his purgative with confidence. I often give a full dose of opium or morphia and follow it by a purgative.

In impaction I rely on linseed oil and turpentine with bella donna Eserine has failed me entirely and several of my friends have had a similar experience with it, though Professor Zuill tells us that the addition of one or two drachms of powdered calabar bean to an aloes ball greatly quickens and facilitates its action, the drug however must be good. To get rid of flatus, charcoal, soda carbonate or bicarbonate, soda sulphite all commend themselves. I have seen great benefit from the administration of a ball of bicarbonate of ammonia, but care must be taken that only the hard translucent portion of the drug is used or it will fail you. If the accumulation of gas is in the stomach or small intestines these measures will be of service, but if in the colon or cæcum they are almost useless; here frequent enemas of soap and water, with a little, very little, turpentine, will be found very beneficial and the best instrument to give them with is three feet of inch rubber hose, having a funnel in one end and the other end in the rectum. An injection can thus be given "safely, quickly, pleasantly." This instrument should supplant the syringe entirely. The bladder is often full in the mare, and it may be emptied by bearing in mind that in the lower animals irritation of the external genitals causes contraction of the bladder, by inserting two fingers into the urethra and separating them repeatedly.

In the horse gentle pressure from the funders of the bladder toward its neck will usually cause urination, if it does not, the injection of four ounces of bland oil with an ounce of chloroform into the rectum will cause sufficient relaxation of the sphincter to allow the organ to be emptied by proper and repeated pressure.

In the July number of THE JOURNAL OF COMPARATIVE MEDICINE AND SURGERY, Mr. Chas. J. Byrne says: "I have used the trocar in thirty-one instances with nine successful results." I have used it more frequently and had no deaths. When should the trocar be used? If the swelling does not respond rapidly to treatment and the intestinal murmur is absent and there is interference with respiration it should be used at once I have punctured a horse four times in a few hours and saved him, but it is no use waiting until an animal is in the shadow of death, and then using an instrument as big as a kitchen poker. The point of election is the seat of the greatest distention wherever that may be. I have punctured on the floor of the belly several times though I do not like it, as abscess follows more frequently on this than on the flank operation. Medicine should not be injected through the canula. The operation should not be undertaken rashly, as the judgement showing its necessity is the growth of experience. The young practitioner cannot get this from his books any more than he can learn to keep half a dozen balls in the air at a time by reading how it is done. When in doubt it is better to be too early than too late. I differ with Mr. Byrne on the question of exercise. I like my "colic" cases kept on the move unless there is weakness of the heart. I can give no better reason for this than the statement that in my experience a colicky horse lying down is usually a horse getting worse. The patient must not be left too soon, the symptoms may abate and return, and care should be had about his diet and work for a few days.

ART. XXV.—AN AMERICAN VETERINARIAN'S IMPRESSIONS OF THE PROFESSION IN ENGLAND.*

BY AUSTIN PETERS, D.V.S., M.R.C.V.S.

Having been appointed, by our worthy President essayist for this meeting, I thought it might be interesting if I gave a short account of what I saw in England, and the impressions I received regarding the condition of the veterinary profession there.

To criticise, in a friendly way, that which I disapprove of, and to praise that which is worthy of commendation.

I presented myself at the Royal Veterinary College, Camden Town, London, May 3d, 1884, armed with letters of introduction to Prof. Robertson, the Principal, and Prof. Axe. Both these gentlemen received me very cordially and kindly, and the Principal showed me over the institution.

The buildings and grounds of the college must cover nearly an acre; there are accommodations for about one hundred horses, besides room for cattle, sheep and dogs. The Principal's house is among the college buildings, and has a nice little garden.

The museum was rather a disappointment to me. It consisted of only one room, with a gallery around it; and, considering the number of years which the college has been in existence, it is remarkably poor, both in pathological specimens and anatomical preparations. What few there are of the latter are not particularly good.

There are three lecture rooms, a post-mortem room, a dissecting room (much too small), a chemical laboratory for the study of practical chemistry (also much too small), a pretty good pharmacy, a good long covered exercise ground, besides the necessary offices, forge, house surgeons' rooms, groom's rooms, etc.

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* Read before the Massachusetts Veterinary Society.

There are also arrangements for hot, cold, douche and vapor baths, which were never used while I was there, and the location of which many of the students did not know; in fact, some of them did not even know of their existence.

The accommodations for patients are good, most of the stalls being boxes, well ventilated and well drained. In short, the arrangements for animals are much superior to those for students. Not that it will do for us to criticise the arrangements for students too closely, as they are much better than in any of the American schools which I have yet seen. Still, in comparison with the schools at Alfort and Berlin (the only two Continental schools which I had an opportunity of visiting) the lecture rooms, the laboratories and museum of the London school sink into insignificance.

The course of study at the English veterinary colleges comprises three years. The first year is supposed to be devoted to acquiring a knowledge of botany, chemistry and materia medica. For this purpose the student is required to attend the immense number of seven lectures a week. The result is that with so little to do, many of the young men form habits of idleness and shiftlessness, to say nothing of, in many cases, dissipation, which they never recover from.

The consequence is that there are to-day men in the London school who have been there four, five, and even six years; bright, intelligent fellows, who, if they had only been started on the right track in the beginning, and made to take up habits of studiousness and industry, would have graduated long ago with credit to themselves and their teachers.

The course for the second year comprises anatomy, histology, and physiology. To learn all this they have only two winter sessions, while for the first year's course they have to spend one summer and two winter sessions. During the second year they also have to attend clinical lectures besides receiving a certain amount of instruction in hospital practice. The last year is the hardest and best, the student having two or three lectures daily—equine practice from Prof. Robertson, cattle practice from Prof. Brown, morbid anatomy and general pathology from Prof. Axe; also lectures upon parasitology from Dr. Cobbold, all of which are very good.

In addition to the above, there are numerous clinical lectures and hospital practice, hospital practice being a sort of practical quiz given to the class in sections, in a box stall, with the horse or ox before them, by Prof. Robertson or Prof. Axe.

Then there is the cheap practice for poor people every other afternoon, where cabmen, costermongers and the like can bring their horses, ponies, donkeys, dogs, and other animals for advice and treatment, paying a nominal fee of a shilling if medicine is dispensed to them or operations performed. The latter fee should be done away with.

As the members of the senior class prescribe for or operate on these animals under the supervision of one of their teachers, and as there are often as many as thirty or forty patients present, it is an excellent opportunity for those who take the interest, to avail themselves of it, to acquire a large amount of useful, practical knowledge.

Then there are about twelve hundred horses a year examined for soundness, which the student has an opportunity of seeing and handling, too, if he desires.

Besides this, there are always from sixty to seventy horses, as well as several dogs, in the hospital, which he can observe at his leisure. Thus it will be seen that the chances for learning many things at the London school are excellent, while in other respects they are wofully deficient.

Particularly to be regretted is the time wasted the first year. This has been partially made up for recently by requiring first year students to dissect a certain amount. Still, there is lack of thorough, earnest work in the dissecting room, and the knowledge of anatomy acquired is much more superficial than it should be.

It would be a great improvement if the curriculum was changed, so as to have anatomy, histology, physiology and general chemistry taken up the first year, letting materia medica come later in the course, and having botany one of the subjects in the matriculation examination. Then there should also be a course in medical chemistry, lectures on obstetrics, and a fuller course in therapeutics; also lectures on zöology and sanitary science and police, microscopical pathology should also be gone into more deeply than at present.

This would be a great advance in veterinary education, not only in the London college, but in the other English schools as well.

Our cousins the other side of the water are so conservative and move so slowly, that it will probably be a very long time before these improvements are made.

The pupilage system struck me as a very curious one. That is, boys who wish to become veterinarians are apprenticed by their parents to veterinary surgeons for two or three years before they go to college. The consequence is that they come to college thinking that they know it all, because they can diagnose a case of colic and know what to give for it. What causes colic and the reasons for giving certain medicines never enter their heads. The result is they do not go to work with a will, and the proportion of students plucked who have been pupils is much greater than among those who knew very little about animals before entering college. If these boys who are apprenticed to veterinary surgeons (often totally unfitted "to teach the young idea to shoot") were sent to some good school or college for the same length of time it would be much better, not only for themselves, but for the profession they are destined to adorn. It would make them more thoughtful, studious and literary, and we would not have so many complaints of the poverty of modern veterinary literature in our own language.

I do not mean to say that these young men are without education. A fair matriculation examination is required before a student can enter the college; but at the same time there is no denying the fact that the time spent in pupilage would be much better employed at school. Some members of the profession in England, particularly the most old-fashioned ones, wish to have the pupilage system made compulsory. No student to be allowed to enter college until he has been a pupil for three years with a veterinary surgeon.

It is to be hoped that this "compulsory pupilage" clause will never be passed, and it will be a good thing when the pupilage system dies out altogether. There has been a great deal of complaint of late among the students of the hardness of the final examination. In my opinion they are fair, but not particularly hard; no questions are asked which a veterinary surgeon should not know.

It is a great thing to have one board of examiners for all the colleges in the kingdom, so as to have the same standard at all of them. It would be a great improvement if we could have some such arrangement in this country, so that all our veterinary schools could have courses of equal length, and the same requirements for admission and graduation. Still, I am afraid that this is something never to be obtained on this continent, and diploma mills will flourish for some time to come, if not always, both in the medical profession and our own.

The fellowship degree of the Royal College of Veterinary Surgeons is a higher degree than that of members, and should be conferred as a mark of distinction for literary work, original research, or something of that kind. But under the present arrangement it is given to a man after he has been a member for five years, if he passes a written examination on various subjects and pays a fee of fifteen guineas. At a meeting of some country veterinary society (I forget just when or where, but the story is true for all that) a member got up and asked what books it was necessary to study preparatory to going up for the fellowship degree. Another member arose and told him that his check-book was the only literary production that he would need to consult.

Under the present state of affairs I should deem it no honor to be a fellow of the Royal College of Veterinary Surgeons, when acquired by undergoing an examination which any student ought to be able to pass when he graduates.

When I first began to study up the course pursued in practice by the veterinary surgeons of England, I wondered how they made a living; a country practitioner getting half-a-crown (about sixty cents) a visit, and sixpence (about twelve and a half cents) a mile for every mile he goes out of town. But I soon found out how he manages. He leaves four to six shillings worth of medicines (costing him about twopence) at every place he goes, and thus makes it up in that way. It does not matter whether the patient requires it or not; it is left. "The laborer is always worthy of his hire," and it will be a happy day for our professional brethren over there when they are better paid for their opinion and receive less for their physic. There are a few occasions when they are properly remunerated, however. There are examinations for soundness and firing, the fee for both of which is generally a guinea, or for firing two legs it is often two guineas. Professional etiquette seems to be unknown among them, or at least, I never heard of it, not even in the lecture room, where you might expect the professors to try and instil a little into the students.

I read last year in one of the veterinary periodicals of Great Britain of a case where two veterinary surgeons swore in court that a brother practitioner's charges were exorbitant, the unfortunate defendant having mulcted a farmer in the immense sum of seven shillings (about a dollar and seventy-five cents) for blistering one horse and giving his opinion on another which had something the matter with it.

But what can you expect when the head veterinary surgeon of the English army leads a magistrate aside during a recess of the court to prejudice his mind against another veterinary surgeon who was on trial. Even if this man had been so ignorant and brutal as to draw a horse's sole for side bones, it was the duty of the witness to injure him as little as possible in giving his testimony, and then to show him the folly of his ways afterwards.

The prevailing idea among the public in England regarding veterinarians is that they are simply horse and cattle doctors. Their usefulness as sanitarians has not been recognized as it should be.

Klein, Burden, Sanderson, and such men have been employed to investigate hog cholera, rinderpest, contagious pleuro-pneumonia, and similar diseases, when it should have been done by the veterinary profession. This may be partly due to the fact that there are very few men among English veterinarians capable of conducting scientific investigations. Still, I think that there are some who could do so, and I think that they have been overlooked and slighted, and have had nothing to encourage them.

One way in which a due appreciation of the English veterinarian is manifested is seen in the recognition of his services by the large agricultural societies.

At all the great agricultural societies shows—at the Smithfield fat cattle show and the cart horse show—the veterinary officer is an important individual. All animals, even pigs, are examined regarding their ages ; an animal whose mouth indicates it to be older than the class for which it is entered is disqualified. True, the veterinarian does not say it is such and such an age, but merely that its mouth indicates such and such an age. That is enough, the animal cannot compete for a prize. Horses which do not pass their examination for soundness are disqualified. Cattle, sheep and swine cannot enter the grounds until inspected and found to be free from foot and mouth disease or any other contagious malady. Neither can they be taken away after the show unless their custodian has a certificate that they are healthy, signed by the veterinary officer.

It is to be hoped that the day is not far distant when our larger agricultural societies will become civilized enough to pursue some such course. It is disgraceful to see unsound horses getting prizes over sound ones at our fairs; three-year-old colts entered in the two-year-old class and taking the highest honors on account of their superior size; and similar cases too numerous to mention. All our large agricultural societies, such as the New England and the various State societies, should have their veterinary officer or officers, to be on duty during their exhibitions, to examine all animals as to their age, to disqualify all unsound horses from competing for prizes, and to attend to any sick animals, free of charge to their owners.

His decision should be final; from it there should be no appeal, and last, but not least, he should be well remunerated for his services from the funds of the society. Until within a few years there has been no legislation to regulate the practice of veterinary medicine in England, but now no one can practice as a veterinarian unless he is a member, or fellow, of the Royal College of Veterinary Surgeons, or a "registered practitioner."

A "registered practitioner" is one who has permission from the Royal College to practice as a veterinary surgeon. They are men who have been practising for a number of years, and as they will not register any young men, in time, as these old ones die off, the profession will consist entirely of members of the Royal College of Veterinary Surgeons.

This concession was necessary, in order to get protective legislation for those who were educated at college.

Now, a word about the hospital connected with the London school—how it is run on the subscription plan, and how it works. The subscription fee of the London Veterinary Hospital is two guineas a year, or twenty guineas for a life subscription. This entitles subscribers to have lame or sick animals in the hospital at a moderate weekly charge, and also to have horses examined for soundness; the fees go into the treasury of the college; the professors receive a fixed salary and are not allowed, except in very rare cases, to make a visit outside the college, and are not allowed to practice on their own account at all.

Unlike some hospitals run on the subscription plan, the London College does very little or no harm to members of the profession practicising near it. Most of its subscribers are very rich and employ their own veterinary surgeons in all ordinary cases; it is chiefly when they have horses suffering from chronic lameness that they send them to the college, after their own veterinarians fail to do them any good. In the London College you see ten cases of lameness to one of any other disease. Then their professors do not compete with other practitioners, as they are not allowed to practice outside. As for their free clinic, that is an excellent charity, although it is grumbled at by a good many veterinary surgeons in London; still, I think it does the poor more good than it does harm, besides being vastly instructive to the students who are allowed to treat these patients.

As for the schools in Scotland, I did not have a very good opportunity for investigating them. I visited both the schools in Edinburgh, but did not see the one at Glasgow.

Williams' school, for a small one, is very good, and considering that it was built by private enterprise, is large and well fitted. The Dick school is a pile of little old buildings. The most imposing thing about it is the statue of Prof. Dick in the yard.

The only Continental schools which I had an opportunity of visiting were those at Alfort and Berlin. At the former the clinic held every morning is very large, and any one in Paris can send animals there, if he chooses to pay for them.

Once a week the students perform various operations on living animals, which are afterwards killed. I was very anxious to witness these operations, but found that in order to do so I would have to get permission from the French Minister of Agriculture, and to get at him I would have had to get a letter of introduction from the United States Minister. As my time was limited I could not very well untangle the red tape necessary for the purpose.

Although France is a republic, and Germany an empire, yet I found it a much simpler matter to obtain access to the school at Berlin than to that of Alfort. I had only to ask for Dr. Lübber, and mention to him the name of Dr. Billings to be treated with the greatest kindness and courtesy, and be shown everything of interest in the institution.

I will not attempt to describe the school at Berlin more than to say that the grounds are large and handsome, well supplied with fine shade trees, and the buildings would make the professors of the best medical schools in this country turn green with envy.

Another respect in which England and the Continental countries are away ahead of us, is in the standing of their army veterinarians.

Over there, when a veterinary surgeon enters the army, he ranks as a commissioned officer, and associates with the other officers. Entering as a lieutenant, he may gradually rise to the rank of colonel.

Here, if a man is so unfortunate as to be connected with the army, he has only the rank of sergeant-major, and has only the non-commissioned officers for associates. This is a state of affairs we should all do our best to rectify as soon as possible.

Now, gentlemen, I have tried to show you in what respect our transatlantic brethren are better off than we are, and also where they are not so well off.

It is our duty to try and improve where we are remiss, and, on the other hand, where we excel we must not recede.

ART. XXVI.—EXPERIENCE WITH MAMMITIS.*

BY CHAS. A. MEYER, D.V.S.

The subject of this paper will be understood by most veterinary practitioners, and I believe one which is very difficult of treating satisfactorily, especially for the owners of dairy cattle, and is known as mastitis, mammitis, caked bag, garget, and sundry vague terms. It is an acute inflammation of the mammary gland, or "udder."

The disease is due to the most diverse causes—lactation is the principal predisposing cause—and appears immediately before or soon after parturition; sometimes it is the result of external injuries, such as blows, or injuries caused while milking, as well as many others too numerous to mention. One other common cause is overstocking, which consists in the preparation of the cow for show, or market, by allowing her to go unmilked, until the udder becomes enormously distended with milk, and which is done to give the gland a fine appearance; at times it again arises through not thoroughly milking dry, the milk remaining in the gland, and acting as an irritant.

My experience has been mainly in cow-sheds which were in a filthy condition, and am satisfied that mammitis is due to putrid infection, and believe that the majority of cases are of septic origin. Much could be said on this subject, but experience is better than theory, as a specific treatment will give good results; my views have been, and are now, that in the majority of cases mammitis is purely a form of erysipelas of the quarters of the mammæ.

The disease rarely attacks the whole gland, but is usually confined to one or two quarters; the affected parts are hot, hard, swollen, tender, and red; the skin is tense and shining; the quarter is enlarged, hard and sensitive to manipulation; some parts feel lumpy from the presence of coagula; by stripping or mulsion of the teat a rose-tinted fluid is obtained, with strings of clotted milk, and usually mixed with blood.

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* Read before the N. Y. State Academy of Veterinary Science and Comparative Pathology.

The constitutional symptoms depend upon the severity of the attack, the disease often being ushered in with rigors; the bowels are usually costive, and at other times unusually loose, the muzzle more or less dry, appetite slightly impaired, pulse quickened, together with general fever.

The prognosis, as given in text-books, is generally unfavorable, and for the first few years of my experience, the treating of the disease was most certainly discouraging. I resorted to all authors, where mention was made in their work, and followed their treatment, and invariably the quarters of the cow affected were lost for the season. I finally resorted to homœopathy, and treated with their specific phytolacca decandra, or poke root, but with no better results; ointments of various kinds were applied, until finally I gave up all hope of ever finding a remedy, and refused to treat any more affected cows—those to whom I was called advised the owners to sell for slaughter.

In the spring of 1882, while pleuro-pneumonia was raging quite severely, I was again called into cattle practice, and came across odd cases of mammitis. I read more deeply, and thought still stronger that there must be some relief for these animals, and finally came to the conclusion that there might be a possibility that the disease might be erysipelas, *per se.;* as Ferri Sesqui Chloridum is a specific in human medicine, why should not a mineral tonic in cattle be a specific as well? I set about treating some cases, and gave directions to give one powder, dissolved in water, *ter in die;* to strip the cow every hour or two, to hand rub the gland with soft soap, and to make a poultice of bran and soft soap, to be applied hot, and to keep changing every hour for six to eight hours; after this to bathe the gland with hot soap water three times a day, and during intervals to apply the soap to the affected parts. The question then arose, where to get the soft soap. I said, make it; Pearline powder will make the best I know of, and is easy of application. About thirty-six to forty-eight hours after the treatment had been used orders came to my office: need not call; cows are all right.

My fee had not been paid, and I naturally thought: well, I will see who has the cases now. I called, was treated rather cool; when the first party said: well, the cows are all right.

Well, was my reply, I called to satisfy myself; don't have any fear, this visit costs you nothing. I came to collect my fee, as it is not much, and to satisfy myself that the cows are well. I was shown into the shed, and, sure enough, my patients were nearly well, giving their full quantity of milk, and looking healthy. Since then my success has been the same, and under this treatment have yet to see a case where failure is the reply, with this treatment.

The only other remedy used internally was and is the following:

℞

Cupri. Sulph.,	ʒij
Nucis Vomicæ,	ʒjss

M. ft. Pulv. No. viii.

Liq. Am. in water t. i. d.

There are many forms of the disease spoken of, and it is very difficult to differentiate between them. I have used the same treatment before parturition, and when the calf was born it did the stripping, and my results were always very satisfactory.

ART. XXVII.—HUMAN AND BOVINE TUBERCULOSIS.*

BY J. M. HEARD, M.R.C.V.S.

Is the bacillus tuberculosis of man the same as the bacillus tuberculosis of bovines? In other words, have we the same parasite in both animals?

The evidence is pretty conclusive that it is. Now this is an alarming state of things; here is a parasite quite common in one of the staple foods of man, and which, under certain circumstances, causes quite a fatal disease in man, and I will mention the fact that the bacillus tuberculosis of cattle behave when cultivated artificially, the same as the bacillus tuberculosis of man; they also color the same. The cultivated bacillus tuberculosis of man, when introduced into cattle by inoculation, produces tuberculosis. Inoculation from cattle to man, of course, has never been surgically attempted.

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* Extract from a paper read before the Newport Natural History Society.

The inoculation experiments have been made upon cows, calves, goats, swine, dogs and rabbits, and have almost invariably led to the development of tubercles; in fact, the large number of positive results go to show that tuberculosis is a highly infectious disease. Inhalation experiments have been made with tuberculous material finely suspended in water, and as a spray introduced into the trachea; or the air which the animals breathed was saturated with the same material. Nearly all such experiments have been followed by positive results. Inhalation and inoculation experiments have sufficiently proven the general virulence and identity of the tuberculosis in cattle and man. We have a record of 321 feeding experiments made upon various kinds of domestic animals with raw materials. Of these, 47.7 per cent. gave positive, and 48.9 per cent. negative results, and 3.3 per cent. doubtful.

It seems that the milk from tuberculous animals does not contain the bacillus tuberculosis, and, therefore, cannot proproduce the disease, unless the udder itself is the seat of tuberculosis, which sometimes is the case, and then the milk contains the bacillus and is capable of producing the disease. Seeing that we are dealing with an infectious disease, you will readily understand how the same may frequently be communicated from husband to wife.

Reich observed in a village which enjoyed excellent healthy conditions, that from July 11th, 1875, to September, 29, 1876, there were ten deaths from tubercular meningitis in children. No hereditary disposition could be traced, but all those children were attended by the same midwife, who had lung disease, and died with it in July, 1876.

There are a very large number of instances recorded which go to show to a certainty that tuberculosis is a very infectious disease, and the feeling is so strong in Germany, not only that tuberculosis is transmittable from man to man, but from animals to man, that a movement is on foot there, subject to the decision of a committee of medical and veterinary experts, to exclude the meat and milk of tuberculous cattle from the market, experiments having shown that tubercles may be produced in dogs, cats, horses, hogs, and other domestic animals by mixing tuberculous meat or milk with their food for several consecutive weeks.

The most common mode of propagation is the respiration of air loaded with the dust of dried sputa, the virulence of which continues for months. Although we are constantly inhaling the germs of this and other diseases we have seen that circumstances must be favorable to their development before infection can actually take place. Can we know too much of the history of this demon which causes one-seventh of all the deaths in the human race? If we can devise some means to destroy the bacilli or their spores, will not the discoverer be entitled to the highest honors that were ever conferred on man?

There should be separate public hospitals in every large city at least, for each fatal parasitical disease, and every person suffering from tuberculosis should be forced to become an inmate of such institution. The principal diagnostic sign should be the presence of the bacillus in some of the discharges, and every physician should be a trained microscopist, and you may depend upon it that it will not be long before it will become a necessity for every physician to be a thorough naturalist, so far as this third kingdom of living beings is concerned.

Art. XXVIII.—THE INOCULATION OF HOGS, WITH REFERENCE TO ERYSIPELAS.

BY PROF. DR. SCHUTZ,
Of the Royal Veterinary School, Berlin.

The immense losses which the farmers of this country suffer from swine diseases, especially the Hog Cholera, certainly justify the publication of original investigations which are likely to throw any light upon their causes or nature. The following article, taken from the *Archiv für Thierheilkunde*, sufficiently proves the necessity of every one of our large stock-raising States having at its disposal a properly organized experiment station and biological laboratory, and employing men as state veterinarians suitable for carrying on such researches.

In making this translation the essentials only of the original will be given.

It seems that different parts of Germany also suffer severely from enzöotic diseases in swine; among these the Grand Duchy of Baden, the Minister of which has lately organized a very thorough study of these diseases. The *protective inoculation of Pasteur* having been strongly recommended, it was resolved to give it a trial. The general use of this prophylactic measure would seem at the outset to be met by several hindering contingencies, in that experience has shown that the various races, or breeds of hogs, possess a varying degree of susceptibility to the infections of erysipelas, as well as towards the protective influence of vaccine, which would render it necessary to investigate these conditions so as to adopt the protective material to the different races. We may also assume that climatic and telluric conditions, as well as those of feeding, housing, etc., also exert no inconsiderable influence upon the susceptibility of hogs to these diseases, as well as upon the action of preventive inoculation.

In order to test these questions a committee of scientific men was appointed, and a large number of swine placed at their disposal. Prof. Schutz was detailed by the Imperial Board of Health, at Berlin, to attend these experiments.*

Prof. Lydtin, one of the most exact and accomplished veterinarians of Europe, and known in this country through his work on Tuberculosis, was given charge of the experiments.

The inoculation began in April of this year, and will shortly be published in full, and extracts from the Report will appear in this journal.

The first swine inoculated were at the station at Heidelberg, the inoculation being performed by Dr. Cagny, who had been especially detailed by Pasteur, for the purpose. †

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* It seems well to call attention to the fact that this very active Board of Health does not, like ours, limit its work to human diseases, but extends its researches to all forms of contagious diseases, well knowing that only by this means can there be any hope of finally coming to any accurate knowledge of the nature of special diseases, as well as recognizing the fact that the wealth of a people is as essential as *their health* to a *healthy nation*.—[Ed.]

† It should be remarked that great as is Pasteur's reputation, he has degenerated from the position a true scientist should assume, not publishing his methods of preparing his vaccine in full, so that others can prepare it, or test his experiments; but has gone into the vaccine supply business, notwithstanding the great liberality with which France has treated him.—[Ed.]

Eight swine, about ten weeks old, were inoculated, each being placed, by Pasteur's special request, with a healthy pig. The temperature and weight of each pig was exactly recorded. The fluid for inoculation was enclosed in glass capillary tubes, one end being hermetically sealed, the other covered with a rubber cap. A fresh supply was daily received from Pasteur's laboratory. The material in the tubes was opalescent, of a yellowish color, and was withdrawn from the tubes by removing the rubber cap by means of a previously sterilized subcutaneous syringe. The animals were inoculated in the subcutaneous tissue of the inner surface of the thigh, each receiving about 3 drops of the fluid: 12 cgrms.

Similar experiments were conducted at different stations over the country.

Prof. Schutz expresses himself as highly gratified, in fact, "that the results greatly exceeded his expectations."

He noticed no great changes in the deportment of the inoculated animals, with the exception of a slight tumefaction around the point of inoculation, and an increase of temperature of about 1° C. The normal temperature of the eight inoculated and eight un-inoculated swine was between 39 and 40° C.

Previous investigations, made in the laboratory of the Imperial Board of Health, with regard to erysipelas in swine, have shown that with this name have been designated *two very different diseases*, both of which assume an enzöotic character in North Germany, in one of these *has always been found a very fine Bacillus*—Erysipelas—and the other, a *larger Bacillus*, that *was only colorable on the ends.* These bacilli are always to be found in the organs and blood of sick or dead animals.*

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* Salmon, in the Report of the Bureau of Animal Industry, 1884, enters into a polemic against Klein, who asserts *hog cholera to be due to a fine bacillus;* while Salmon claims *it to be due to a Dipolococcus*, and also supports his assertion by quoting that Pasteur has found the same. Here we seem to have the key to the whole story. Salmon's diplococcus is probably this bacteria of Loefler, the spare carrying ends of which seem only to be colorable, the middle not taking the color—while Klein found the fine rod of erysipelas. It is a well-known fact that Pasteur never mastered the art of coloring bacteria, and thereby differentiating them until within the last year. His researches were made some years ago.—[Ed.]

The first of these bacilli resembles much those found in septicæmia of mice, and the last those of fowl cholera. Both of these have been cultivated in meat-infusion gelatine. It is, accordingly, of importance to find out which of these two, ætiologically different diseases causes the losses in Baden as well as in Germany and France, and why not in America?—also from which of them the material supplied by Pasteur proceeds, if we are to obtain protection of swine by inoculation.

In order to ascertain whether it was erysipelas or hog cholera, or both, which afflicted the swine in Baden, I procured either the cadaver, or parts of the same, from swine that had perished from the so-called erysipelas. I found that this disease generally came to eruption in Baden in the month of May; but these assertions cannot always be depended upon.

I made covering glass preparations from the spleen of swine, and found in them large numbers of the previously-mentioned fine rods—bacilli.

Prof. Schutz then inoculated a number of white and the tougher domestic mice with this material; also making June cultivations of the same in gelatine, from which he also inoculated the same kind of animals. In from two to four days—according to the species—the animals all died? The microscopic examination of the blood and organs of these animals proved the same bacilli to exist in them as those with which they had been inoculated. Cultivations from them also gave confirmatory results.

Guinea pigs proved to be insusceptible to infection, though further experiments should be made before this evidence is looked upon as conclusive. Loefler has also shown that they are resistant to the influence of the bacilli of mouse septicæmia, though some local reaction is perceptible.

Rabbits succumbed to inoculation. The bacilli were found in their tissues.

It was now necessary to prove these bacilli upon swine. This was done with material from the organs—spleen—of swine that had succumbed to the natural disease, as well as with June cultivations which had been taken directly from swine, as also from those that had been carried through the mice.

For the full report of these experiments, as well as the microscopical results, we must refer to the original; suffice it to say, each one of the inoculated swine perished from erysipelas as from the natural disease.

It should be remarked that the spleen offers the most favorable locality to examine for the bacteria of this disease, as well as many other diseases, excepting human cholera.

The method of preparing covering glasses for superficial study of these questions, is as follows:

1st. Clean the glass thoroughly.

2d. Take a pair of delicate forceps, and then with a disinfected and clean knife cut quickly into the substance of the organ—(or of fluids the same method, except the cutting, is not necessary); then take up a very little of the organ and spread it out as thinly as possible on the covering glass; as soon as it has dried in the air, take the glass by the edge with the forceps and pass it slowly through the flame of a spirit lamp (Brunsen, if convenient) two or three times; the side on which the material is spread must be uppermost. This procedure coagulates the albumen, and everything adheres firmly to the glass. Then drop upon the glass sufficient of an aqueous solution of gentian violet, or some dark aniline color; let it stand two or three minutes, and then wash off. Dry the glass on filtering or white blotting paper. Place a drop of oil on a slide and put the side of the covering glass containing the material upon it. An ordinary microscope is useless.

To the study of bacteria one must have oil-immersion objectives and an able condensor.

The question now open is: what are the conditions in hog cholera?

Can we not produce an inoculative and preventive material in this country?

Must we sit still, and let all this work be done in Europe, while our hogs are dying almost by the millions?

All that can be said is, if the States will give us a chance the veterinary profession can produce the men to do the work.

ART. XXIX.—THE ETIOLOGY OF ANTHRAX.*

BY PROF. BOLLINGER AND DR. THEO. KITT, OF MUNICH.

Bollinger concludes from the study of the epidemiology of anthrax made by Dr. Friedrich upon the influences of moisture of the earth and its temperature as well as that of the atmosphere, that an eruption of the disease is favored:

1st.—By a certain moist or swampy nature of the locality. 2d.—By the infection of the earth by the germs of anthrax. 3d.—By the sinking of the ground water. 4th.—By a certain degree of increase in its warmth following on the same.

As the rise and fall of the ground water in any locality is dependant principally on the amount of rainfall and somewhat, also, on the degree of dampness prevailing in the atmosphere, we are thus enabled to judge approximately of the probability of an eruption of anthrax in anthrax regions from the results of meteorological observations.

The prophylactic treatment of such localities by means of drainage, and by avoiding the pollution or infection of the earth with anthrax material—cadavers, the manure or offal of diseased animals, will always be the chief means of preventing an outbreak of the disease.

The investigations made by these observers have conclusively shown that variations in the earth's moisture plays the same *rôle* in anthrax and rinderpest as it does in typhus (typhoid) and cholera. Kitt's investigations have led him to conclude that the alvine discharges from cattle affected with anthrax play the most essential part in the extension and support of the disease; *i.e.*, dispersion of the virus and infection of the earth. The alkaline or neutral reaction of the fæces of cattle represents, in a certain manner, a natural, solid medium for bacterial cultivation, or the support of germ life in the sense of Koch.

It is only necessary that we place the freely discharged fæces of cattle under a suitable bell-glass to observe that the different varieties of fungoid life each, at first, develope as isolated colonies, or pure cultivations. In spontaneous cases of anthrax, *i.e.*, such as find their origin in spore-infection, and not by inoculation, we always find the fæcal discharges more or less hæmorrhagic and covered or mixed with mucous, having a decidedly alkaline reaction.

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* "Deutsche Medicinische Wochenschift," 1885. No. 29, p. 507.

It has also been shown that in spore-infection the chymus contains innumerable numbers of the anthrax germ in the form of rods, threads and spores. We are thus justified in concluding that the inficiens of anthrax is plentifully mixed with the fæces in cases of natural infection. When the temperature is suitable—the hot days of August and September—it is probable, as well as possible, that the anthrax inficiens thus contained in the discharges of such patients finds most favorable conditions for the development of permanent spores, thus providing a natural means for the continued infection of localities where such material has been dropped by animals or placed by man.

Having made such observations in the noted anthrax regions of the Bavarian Alps, Kitt was incited to make a series of experiments with the fæces of horses and cows alone, as well as mixed with blood and urine from these and other animals. These materials were first sterilized by exposure to hot steam for about six hours, and then inoculated with anthrax blood and pure cultivations of the germs of the disease. Upon the alkaline fæces from cattle the germs developed to threads and spore-carrying bacilli; remarkably luxuriant cultivations were observed upon the same medium in which blood had been well mixed before sterilization. That the germs developed were in reality those of anthrax was proven by feeding a small quantity of the above medium with the germs on it, to sheep. Even when anthrax blood was mixed with freshly discharged fæces, the germs developed at first as pure cultivations when placed under the bell-glass, but naturally the various colonies of fungi soon ran into one another. Neither fresh horse manure nor that which had been mixed with blood or urine offered very favorable conditions for the development of anthrax bacilli. The natural reaction of horse manure is generally acid.

Neutral or alkaline urine from cattle, horses or sheep did not offer the same favorable conditions for the development of anthrax bacilli that has been found in the neutral or alkaline urine of man.

While the desiccation of such manure is known to be detrimental or finally fatal to the continued vitality of the rod bacillus, it is known that such conditions are without influence upon the spores of this disease.

ART. XXX.—EMMERICH'S SO-CALLED "NAPLES CHOLERA BACTERIA." *

The cholera question is still the one that is at present absorbing most of the attention of the world's patho-mycologists. The discovery of Koch's comma has awakened more discussion than any other of the kind that has ever been made. While but few, if any, observers deny its presence in connection with Asiatic cholera, and in fact, many of the most competent of them fully agreeing with Koch—such as Van Ermingam of Brussels, Watson, Cheyne—others have not accepted his conclusions, even going so far as to deny its diagnostic value when cultivated in tubes of flesh-water gelatine, which is misleading and dangerous in the light of the almost universal testimony to the contrary. Of this latter class is Klein—an English observer, in whom very little reliance can be placed, if we are to judge from the trustworthiness of any work of this kind that has yet emanated from him.

The most interesting, and upon its face, most trustworthy observations in opposition to those of Koch and his supporters that have as yet been given to the public have proceeded from Dr. Emmerich, a doctor of Munich, attached to the Biological Laboratory of the University at that place. Emmerich was sent by the government to Naples during the eruption of cholera in that city in the fall of 1884, in order to get material for bacteria investigations. He went after Koch's comma in particular and to make all the study of disease possible *in loco*. It might be here mentioned that one of the great incentives to opposition to Koch's observations and conclusions was the sacredness with which he guarded his culture material, no one being able to get any from him, and the exclusiveness which want of room and other unavoidable circumstances threw about the cholera courses at the laboratory of the Imperial Board of Health at Berlin, during the last winter, for which Koch was not to blame in any manner.

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* From an address delivered before the Medical Society of Munich, April 1, 1885. (Taken from the "Berliner Klinische Wochenschift," 1885, p. 237.)

The observations which Emmerich made led him to such entirely different conclusions than those of Koch with reference to the specific bacteria of cholera, that they deserve the widest publicity, and most sceptical study, especially as we have that dreaded disease here this summer.

At the meeting above alluded to, the remarks of Dr. Emmerich were essentially as follows :

It is at present the prevailing opinion among pathologists that the vibrio of Koch is the cause of Asiatic cholera, supporting themselves by the assumption that " no other form of pathogentic fungi are to be found in the blood or organs of cholera patients." My investigations at Naples have led me to quite the opposite conclusion, for in the blood *and organs* of nine cholera cases I *found the same form of bacteria,* which further study and repeated experiments have led me to strengthen my opinion that they must be looked upon as the immediate cause of cholera.

Emmerich has previously reported these bacteria, a staff-like (rod) bacteria twice as long as thick, somewhat resembling those of typhoid and not vibrios or curved bacteria. The vibrios of Koch can be of but secondary importance, as they have only been found in the intestine (or discharges) and but exceedingly seldom, and in the walls of the intestines, and never in the organs of diseased persons. It may yet be possible to demonstrate that the Koch comma is a constant resident in the intestinal canal of man, or one which developes there only under the peculiar conditions present during cholera.

As I have already mentioned, Emmerich's first examinations and experiments have found endorsement by others, subsequently performed, in which V. Schlen and Buchner have taken part. The first question to decide is, " Do the fungi found in cholera cadavers occur as pure cultivations in the blood and organs? or have we to do with a mixture of various forms?" The first would speak for their pathogenetic importance, while the last would have the contrary value. Peate cultivations made in Munich with the material from the tube cultivations inoculated direct from the blood and organs of cholera patients in Naples have abundantly shown that the fungi were present in an unadulterated condition. For the present I will designate them as the "Naples cholera bacteria."

As further proof of a most convincing character of the purity of these Naples cholera bacteria in the organs of cholera cadavers has been given "by the studies of V. Schlen upon microscopic preparations from the portions of organs brought direct from Naples in absolute alcohol. In these organs, as well as in material brought from India, he was enabled to find these peculiar bacteria in such quantities and so widely dispersed as to sufficiently warrant their ætiological relation with the phenomena of cholera, as well as the pathological conditions observed in the organs of persons that have died of the disease." We have the right to assume that these bacteria are the ætiological movement in connection with cholera, that we have to think the typhus (typhoid) bacillus is the cause of that disease.

The constancy with which these bacilli were found in all tissues that were examined for them, naturally leads us to the question: "How is it that they have been overlooked by other investigators?"

This has not been the case, however. It is well known that Koch made no mention of the comma during his Egyptian studies, but did speak of finding short rod bacteria in the walls of the intestines, while the curved vibrio came first to his notice in India. The French Cholera Commission to Egypt also reported finding short rod bacteria in the walls of the intestines and in their contents.

The studies of Buchner with reference to the biological peculiarities of the Naples cholera bacilli have shown that they bear closer resemblance to those of typhus than any other known form. This conformity was not only in their microscopical appearance, but also in the group, or colony form, but especially in the chemical characteristics, while other bacteria of the human body, drinking water, etc., showed great variations from them in these essentials. These cholera bacteria have far more vital energy than those of typhus, which entirely corresponds with the clinical department of the respective diseases. The Naples bacilli are very resistant to external influences, possessing an exceeding degree of vitality; they readily withstand exposure to (minus)—24° C for a period of twelve days, as well as four weeks desiccation at room temperature. These peculiarities are directly opposed to those of Koch's bacteria, which will not withstand desiccating for over three or four hours, and especially to be noted is the fact that these Naples bacteria can live without oxygen, which is not the case with Koch's comma, and is not without value in considering them as an inficiens.

The most striking proof of the correctness of our conclusions has been given by our experiments upon animals, which resulted in producing disease phenomena in almost every essential corresponding to those of Asiatic cholera in man.

Thirty guinea pigs, four dogs, six cats and a monkey were used for this purpose. The material was introduced into most of them sub-cutaneously. Diarrhœa and vomiting did not occur in the guinea pigs, but did in a most severe form in the larger animals. One of the dogs had repeated attacks of emesis, and eighteen diarrhœal discharges, finally became rice-water-like, in twenty-four hours. Another dog vomited twelve times in the same period. The vomitus consisted at first of particles of food, and had a decided acid reaction. Later it became more watery and contained yellowish flakes of mucous which had an alkaline reaction, as is the case in man. The other clinical phenomena, such as cyanosis, rigor, stupor, the rapid emaciation, anurias, indican in urine, etc., were also almost constant in the larger animals.

The chief conditions of value revealed by the microscopical examination of these animals were excessive rigor mortis, emaciation (not loss of fat), dry musculature, pleuræ and peritonitis, covered with a viscid mucous mass; ecchymosis in both; red color of anterior intestines, alkaline reaction of the thin, watery, or gruel-like, contents of the intestines, mesentery glands swollen, spleen always normal in size, liver dull red, gall and bladder much distended, kidneys of a dark brown-red color, yellowish striæ upon a grayish-red surface, were observable in these organs when the disease had two or three days duration; bladder either empty or contained a few drops of clouded urine. Above all these conditions, especial emphasis must be placed upon the constantly appearing viscid mucous peritoneal exudate, in every form of inoculation, which, as is known, is so peculiarly characteristic of human cholera.

The Naples bacteria were present in this exudate in immense quantity.

Are they also present in such numbers in this same material in human cholera?

The organs of all these animals were also proven in the same manner as those from human beings in Naples:

1st. By cultivations.

2d. By microscopic examinations, the results entirely confirming those previously alluded to.

The Naples bacteria were also found in the contents of the intestines. This is of importance, as it shows for the first time that the sub-cutaneously introduced bacilli not only find their way into the blood and organs, but also into the intestinal cavity. This fact does more to shake the drinking water theory than anything else. Feeding animals with great quantities of the bacilli gave negative results in each case. The same animals at once reacted in the above described manner when subjected to sub-cutaneous inoculation.

The autopsy of the monkey was made with great care by Prof. Bollinger. One of the most essential pathological phenomena was that held by Piragoff, Virchow, and lately, Eichhorst, as characteristic of cholera, and that is the typhus-like changes in the ileum with beet-like—"beetætige"—swelling of Peyer's plaques with a dark red area around them. The omentum, mucous of stomach and pericardium were the seat of numerous ecchymosis; spleen normal, beginning fat degeneration in the kidneys. With reference to the results in the intestines it can only be said that if we will not accept them as due to cholera, we must fall back on the assumption that we had to do with an exceedingly violent and acute case of typhus abdominalis (typhoid). All the accompanying phenomena contradict this last assumption as well as the circumstance that no typhus, but quite another bacillus was injected, which we have also demonstrated, in the organs and blood. There remains to us, then, but one conclusion, viz.: the acute infectious disease of which the monkey in question died must be looked upon as genuine Asiatic cholera.

These Naples cholera bacteria have another essentially varying quality from other fission fungi, *i.e.*, those of septicæmia, in that it requires a proportionally great number of them to cause infection in an animal. Small quantities are absolutely inactive; their virulence is not increased by continued direct inoculation through a series of animals. The want of any disposing conditions in animals to cholera is probably the reason that such large quantities are required to produce infection.

Emmerich sums up the results of his various investigations and experiments as follows:

I consider the Naples cholera bacteria as the active agent which we must make answerable for the pathological changes in cholera. Koch's theory fails of proof and is supported chiefly by hypothesis. Koch says that "he assumes that the comma bacilli are to be demonstrated early in the disease. The want of resistability of Koch's vibrio, the fact that they lose their vitality so quickly on desiccation is directly opposed to the epidemiology of cholera, which in India occurs during the time of the greatest drought. Finally, the vibrio of Koch are not always present in predominating numbers in the alvine discharges of cholera patients." I have often made ten or more plate cultures from one discharge during my stay in Naples and found none. On the contrary, the Naples bacteria have always been present, frequently in nearly pure cultivations, and always predominating over the vibrio of Koch in number."

I do not, by any means, mean to assert that these investigations into the etiology of cholera have entirely closed our work, but do think that they have given us a firm foundation from which to proceed in the work.

So much for Emmerich. V. Schlen, Pettenhoffer, Frolenius, Buchner and others all took an active part in the discussion, to the original report of which we refer those interested, as we have here only essayed to give the direct evidence brought forward by Emmerich, and the conclusions to which they have led. The gentlemen named above all bear witness to the correctness of his assertions.

EDITORIAL DEPARTMENT.

THE NECESSITY OF AN ORGANIZED INSPECTION OF OUR MEAT AND MILK SUPPLY, BY EDUCATED VETERINARIANS.

Although we have, in almost every issue of this journal, referred to these important questions, and, in our last, published a sketch of the methods in vogue at the best conducted abattoir in the world, we do not seem to have been successful in planting any fruitful seed. One of the most surprising phenomena in this connection is, that none of the medical journals in this country have either noticed these articles or given that attention to the subject which they should do as guardians of the public health.

It has thus far been impossible, both by personal advocacy and reiterated appeals in writing, to make any impression upon Boards of Health.

Neither the State or city representatives of the people seem able to realize a fact that has long been patent to the intelligence of the same class of men in Europe, *i. e.*, that none but qualified veterinarians can be trusted to do this duty properly.

Such authorities assume that any politician is much better suited to guard the public health, in these important matters, than men whose professional studies especially adapt them for these responsibilities. They do not seem to be aware that the educated veterinarian knows that the advancement of his profession depends upon his being strictly honest in such duties.

Our attention has been again called to these questions, by reading the following remarks in a number of Chicago daily papers:

> The article says: "The health inspectors are apparently in ignorance of the fact that diseased sheep are almost daily sold at the stock-yards. Sales are made openly, despite the presence of the inspectors. and no bar has thus far been interposed to stop the repulsive traffic. The animals are shocking spectacles, and the idea that such stuff is sold daily as food for thousands is horrifying. A thousand diseased sheep are bought at the stock-yards daily by mercenary 'scalpers,' and sold to the unsuspecting public as good mutton. A syndicate is interested in the traffic."

Now, who consumes such meat? The poor and needy! who, if they cannot have luxuries, should have what they use as food guaranteed to them to be of the healthiest quality.

As a supplement to the above we may say, that we know of butchers who sell entirely among this class of our citizens, that make it a practice to buy nothing else but diseased animals, the flesh of which they peddle about from their carts, in the face of the authorities. Such animals never find their way to the inspectors, but are slaughtered in sheds, barns or out-of-the-way places on the confines of our cities.

Hence the need of a public abattoir in every city. Hence the need of the most stringent laws forbidding slaughtering anywhere else.

We pretend to have an inspection of the milk supply of our cities; yet, in spite of it, the veterinarians of any of them could easily show the Boards of Health where hundreds of illy-fed, poorly-housed cattle are packed together in hovels, with filth above their ankles, breathing a stench almost impossible to endure, and almost every cow the subject of tuberculosis.

We recently went the rounds, with the meat inspector, of a neighboring city, and came across a poor, emaciated cow—"a new milch cow"—with a calf by her side; the cow was pretty well gone with tuberculosis, and what made her especially interesting was, she also had manifest tuberculosis of the udder.

We asked the inspector "what he was going to do under the circumstances?" His answer was: "I can do nothing; the law does not recognize these cases." The cow was sold; went into a poor neighborhood, and her milk was peddled out to deal the seeds of that fellest of all destroyers among the children in the vicinity, consumption.

The Government of the United States says, "American hogs are almost free from trichinæ," yet one can read nearly every week of persons dying from the effects of this parasite.

Mr. Redding, whose Report to the Indiana Board of Health we have reviewed in this issue, says: "The highest percentage of infested hogs were those of the retail butchers."

We have examined more American pork than all the other examiners together, and found four per cent. trichinous.

NONE TOO MUCH QUARANTINE.

Under the heading of "Modification of the Quarantine Needed," there appeared an editorial in the weekly issue of the *National Live Stock Journal*, arguing that the States west of the Mississippi had no longer good reason for continuing a strict quarantine against cattle from the States east of that river in which pleuro-pneumonia still exists, especially the States of Kentucky and Illinois. The authorities of the western ranging States must be fully aware that should the dreaded lung plague once reach the free cattle of their ranges, it cannot be stamped out, even with the possible hopes of final extinction which exist under the more restricted manner of herding cattle in the States East of the Mississippi.

The argument that the newly-appointed Live Stock Commission of Illinois will be found capable of confining any existing disease to the infested localities will not hold good until the ability of said Commission to do so has been proven by experience.

Two years ago no one thought it probable that the lung plague would extend its ravages over the Alleghanies to the cattle of Ohio, Illinois and Kentucky. Yet it did, and as it has once extended west of the Mississippi, there is no reason to assume that it may not again, under existing circumstances. The lung plague cannot be stamped out, nor the danger of its extension completely annulled so long as the State in which it exists adhere to their irrational manner of insufficiently remunerating owners for cattle slaughtered on account of the disease. Their action in this regard makes it necessary for each owner of infected or suspected herds to consider his own pocket before his responsibility to the good of all owners. Again, the lung plague cannot be stamped out until in the place of Cattle Commissions we have one State veterinarian, county and district veterinarians, and the same laws for the treatment of contagious animal diseases in every State.

Hence it is that the States west of the Mississippi must still adhere to their quarantine restrictions against Eastern cattle. The danger that threatens them is too great to allow of their amelioration under the impotent powers still existing in eastern States for the restriction of these diseases.

It is only by an obstinate adherence to this principle by the great breeding States that we can ever entertain hopes of finally bringing legislators, both National and State, to realize that these questions should be treated in a liberal and intelligent manner.

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STATE VETERINARIANS.

It is a sign of the advancement of our profession in public appreciation that several States have lately made the position of State Veterinarian one of the regular appointments of the Governor or their Legislatures. It is singular that nearly all these appointments have been made in western States, and to their credit also, that the majority of them have been conferred on regularly graduated men.

Professor Liautard of the American Veterinary College of New York City, could certainly ask no better endorsement from the public, of his self-sacrificing endeavors to elevate his and our profession, than the fact, that most of the men thus selected have been graduates of the American Veterinary College.

If these positions can be assured to veterinarians as permanent, and free from political influence so long as the occupant does his duty, the governments of the different States can be assured of obtaining the very best among the young men in the profession to fill them. Otherwise they will have to take up with what they can get, for no man can afford to give up the competency which he can gain in practice for any temporary official position.

The Governor of Nebraska, in selecting Dr. Julius Gerth, jr., as State Veterinarian, is to be congratulated, and we can assure him that his selection will not fail him.

The writer probably knows Dr. Gerth better than any other person in the country. His career has been one of remarkable success, and it is well that we place before our colleagues the reasons therefor.

With many disadvantages, the greatest of which was his youth. with an education in no way superior to that of his colleagues in the profession, he has gradually worked his way into a position of respect and influence in his native State, New

Jersey. The reason of this success is to be sought in the fact that at school he became instilled with the true principles of veterinary science, and came to a knowledge of the true relation of the veterinarian to the State, as an officer of the public service, and an active agent in the prevention of human disease, as well as the contagio-infectious diseases which play such an essential role in national economy.

From the day he first entered practice, Dr. Gerth has made these principles the guiding star of his life. He has done more than any one else in his State to impress upon the authorities the fact that they owe a certain amount of deference to the educated veterinarian over the uneducated empiric, which fact has borne fruit in the endorsements of the State Board of Health, and that of the city of Newark, in their actions and appointments.

Having thus studied these conditions, Dr. Gerth has shown that his abilities lie mostly in the direction of organizing and directing a veterinary sanitary police system. He is also remarkably free from the curse which has thus far disgraced most of the veterinary officials in this country—which has been the fear of appointing men of real ability to act under them. We know that the State Veterinarian of Nebraska has none of this smallness in his nature, and that he realizes that the better qualified his assistants are the better will be the work done in his department, Our profession may be assured that he will work for its elevation even more than he will for his own personal gain. Success to him, and every other State Veterinarian is the wish of this journal.

INOCULATION AGAINST BLACK-LEG.*

In seven Swiss Cantons—or districts—there were inoculated 2,199 cattle on account of the prevalence of this disease. These animals were then placed at pasture upon lands where the disease was known to prevail each year to an alarming extent. The results in various localities in the Alps where 908 inoculated and 1,650 non-inoculated head of cattle were pastured were, that of the 908 inoculated animals only two acquired the disease; while of the 1,650 non-inoculated, 101 died, Inoculation has been adopted to a much greater degree on this account. The preparation of material for inoculation was after the method of Arloing, Cornevin and Thomas, and is as follows:

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* Adam's "Wochenschrift fur Thierheilkunde," 120, 27, 1885.

Take a quantity of the blackest appearing tissue from the tumefactions of this disease and cut it up in small pieces; to this is to be added one-half its weight of ordinary water; the mass is then to be rubbed up in a mortar until it becomes a fine mush, it is then to be pressed through a strong linen cloth. This product is now to be filtered and placed in very thin layers in broad, flat-bottomed glass dishes, and quickly dried at a temperature of between 32° and 35° C., then scraped off with the cleanest of knives—the blade should be passed through a flame first—and put into glass tubes and hermatically sealed. For use, take one part of this material—virus—and mix it with two parts of water by rubbing; it is then to be put in a saucer, and placed for seven hours in a thermostat, at at the above temperature. The substance thus obtained has the appearance of brown scales.

Two varieties of virus must be prepared—a primary and secondary.

The first is obtained when the virulent fluid *first* prepared is exposed to 100° C., and the *second* when the same fluid is exposed to 85.6° C.; heat for seven hours in a thermostat. One centigram of the desiccated material corresponds to one gram. fluid before it is introduced into the oven. Such dried material will preserve its active qualities for at least a year.

The end of the tail is the point taken for the inoculation. The animal should be inoculated twice within ten or fourteen days, at first with the secondary and then with the primary virus.

To this end we have fifty parts, by weight, of water, to one of the dried material, and rub them up thoroughly; filter. The amount received is then carefully introduced into the subcutaneous tissue, by first taking a sterilized trochar, and making a canal eight ccms. long, and then introducing the syringe; the skin should be closely compressed upon the trochar so as to prevent the fluid running out. The wound should be carefully covered on removal of the instrument.

The proper time for inoculation is in early spring, while the cold weather continues. Bad results seldom follow. It should not be done after warm weather sets in.

According to Arloing and Cornevin, the inoculated animals retain an immunity against natural infection for from seventeen to eighteen months.

A supreme rule for all such treatment is clean and absolutely sterilized utensils.

THE DUTY ON SCIENTIFIC BOOKS AND INSTRUMENTS.

We have formerly alluded to this subject in the columns of our journal, but it is of such importance, and there is so much injustice connected with it, that it deserves not only repeated, but earnest attention.

The medical editors of the country have not taken any notice of the subject. The reason may be sought in the fact that many of the journals conducted by them are really owned by publishers who simply use the journals as a business medium for advertising their own publications, caring little for the advancement of the profession, or for the members increasing their knowledge through foreign literature.

Again, a great injustice is done those individual members of the profession who really care to elevate themselves, from the fact that the schools can obtain books and instruments free of duty, but the laity or the teachers at the schools cannot for their own use.

While at the school the poor student can have access to foreign books and the use of instruments, but when he leaves it, both are shut off from him, no matter how much he may desire to study, or to make researches, on account of the extra cost of implements for his work.

We have heretofore styled this duty on these things as an embargo on knowledge and a premium on ignorance placed by the government on the scientific profession.

Why schools should be thus favored and the really enthusiastic scientists, whose work would really be of benefit to the country, be thus hindered in their work is a problem difficult to solve. If there be any independence of thought and action in medical journalism in this country; if there be any common sense and a true appreciation of justice in the medical profession; if there be any desire to improve and advance the public weal among the editors of our daily press, this important topic will not be left any longer to the advocacy of a single medical journal in the United States.

REPORT OF THE CENTRAL VETERINARY SCHOOL, AT MUNICH, BAVARIA, FOR THE YEAR 1883-4.

Owing to the death of Prof. Franck, the direction of this school has been placed in the hands of Prof. Karl Hahn.

While the Munich school is not so extensive in lands and buildings as many others in Europe, the proof that it is second to none of them in the earnestness and activity of its faculty is abundantly demonstrated by the following scientific and literary contributions during the year in question.

In this regard it bears a remarkable comparison with the utter stagnation that exists in the most completely fitted school in Europe, that at Berlin.

From Dr. Bonnet we have: A contribution to the embryology of ruminants.

From Prof. Feser: 1st—The action and employment of physostigmim sulfuricum in horses and cattle; 2d—The relation of the centifugal method to the dairy; 3d—A report upon the cattle at the exhibition at Hamburg, 1883; 4th—Studies upon the cattle of Bavaria; 5th—The better use of the cow milk in the Algan district.

Prof. Horz: A text-book upon agricultural seeds and other contributions of the same kind, as well as those of a bacteriological nature.

Dr. Tappeiner gives four valuable contributions of a chemical character, especially one on the chemical diagnostic examination of the patient.

From Dr. Kitt we have: 1st—A contribution to the early history of the horse; 2d—Studies upon the formation of the skull among Bavarian cattle—a morphological character; 3d

—The influences of breeding upon bos brachyceros; 4th—The same, extended; 5th—Numerous short contributions to bacteriology, all founded upon original studies.

The attendance during the winter session of 1883-4 was 112 students; summer, 96; number of successful graduates, 13. The pathological museum was enriched by the addition of 139 new specimens.

Whole number of animals treated in clinic, 552; number of forensic examinations for soundness, 90; number of animals with contagious diseases brought to hospital, 6; number of animals treated in free clinic, 869.

Dr. Kitt gives a very interesting continuation of the studies begun by Schultz and Loeffler, of Berlin, upon the bacillus of glanders. The material was taken from a thoroughly intact Farcy-bud, after the hair had been carefully shaved off, and the skin thoroughly washed with a solution of mercuric chlorid. The bud was then opened with knives that had been previously subjected to a red heat. The contents of the bud was at once distributed in the smallest quantities possible in isolated spots over the surface of sterilized potatoes and upon blood serum. Noduli from the lungs were also used under similar precautions. The cultivations were made in the thermostat at a temperature of 37.8° C., and in the ordinary temperature of the laboratory. Notwithstanding the care taken in procuring the material some foreign germs were seen to have developed upon the potatoes inoculated with pulmonary material. Upon the others the cultivations remained pure. On the blood serum one could see—third or fouth day—isolated yellow points, which soon increased in size, that both examination and experiment proved to be true glanders bacilli. Cultivations on potatoes have a pale varnish yellow color. The bacilli of glanders are somewhat smaller than those of tuberculosis, having a length of .0007—.0024 mm., but are a little thicker. They color easily in methyl-violet. They probably develope spores. The inoculation of rabbits with pure cultivations of these bacilli gave unmistakable indications of nasal and pulmonary glanders on microscopical examination. The same author also describes a continued series of experiments with the germ of fowl cholera which, according to him, is coccus, occasionally having the form of a diplo, or double coccus.

Pure cultivations of this germ upon flesh-water gelatine, and solidified blood serum appear as a pale, transparent white coating or mycoderm upon the surface of the medium ; they do not cause fluidification of the medium. Some of the cultivations of the first generation were polluted by the presence of an extremely delicate bacillus. These cultures had a very offensive odor which was not present in those of a pure character.

Numerous experiments were made upon fowls as well as upon animals. In the latter abscesses developed, but a fatal termination did not always follow, except in rabbits and small animals.

The cultivations retained their virulence for over four months. These cocci were found to pass through the placental circulation into the fœtus in healthy guinea pigs, as well as into the yolk in the hen eggs. Almost all the animals that perished from the experiments were fed to three young dogs without causing any disturbance.

ANNUAL REPORT OF THE ROYAL IMPERIAL VETERINARY SCHOOL, VIENNA, AUSTRIA, 1883-4.

For the regular three years' course there were	203	students.
For the different grades of horse-shoers during the year	578	‟
The diploma of graduation was given to	46	‟
The library contains 4191 works of 10,774 volumes.		
Whole number of animals treated in the Internal and Surgical Clinics	3057	
Number of Dogs treated in the hospital	1347	
Number of Dogs examined as rabid	161	
Number of Dogs examined as suspicious of rabies	1142	
Number of Dogs examined necroscopically	54	
Number of Dogs killed at owner's request	1198	
Number of Horses subjected to a forensic examination for soundness	215	
Number of Horses shod at school forge	7876	

The report is replete in numerous clinical histories with reference to interesting cases that occurred in the hospital during the year.

SUGAR IN THE URINE OF COWS IN PARTURIENT APOPLEXIA.*

Nocord, of Alfort, repeatedly calls the attention of students in his lectures on obstetrics, to the similarity of the phenomena of this disease in cows to those of uræmia in man.

He has been much disappointed in the results of the chemical examination of the blood from such animals with regard to retained urates.

On the other hand, small quantities of albumen have been present in every case, and sugar in varying quantities. He has never been able to find the latter before in the examination of the urine of diseased animals.

Prof. Yvon, the chemist of the Alfort school, examined the urine from six cows having the disease, and found sugar in each, viz.: in one litre of urine, 1.10; 1.85; 6.60; 13.20; 25.30; 44.80 grammes, respectively. The first three animals recovered, the last three died from the disease. It is, therefore, probable that the percentage of sugar in the urine bears some relation upon the prognosis.

On recovery, the examination of the urine revealed the entire disappearance of the sugar. Sugar was never found in the urine of cows that had calved in a natural manner.

THE UNITED STATES VETERINARY MEDICAL ASSOCIATION.

The annual meeting of this Association was held at the American Veterinary College, on the 14th of September. The meeting was made notable by the general absence of the majority of its members. An election of officers took place, resulting in the election of Dr. McLean, Sr., of Brooklyn, as President; Dr. Cosgrove, of Mass., Vice-President; Dr. Robertson, of New York, Treasurer; and re-election of Dr. Minchener, of New York, as Secretary.

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* Oesterreich. "Vierteljahrschift f. Veterinair Kunde." Vol. 63.

If one were asked, "what these meetings are held for?" it would be hard to answer, except to say for a sort of social coming together. For years they have worked by a decided poverty in papers or discussions of any value; hence, it is no wonder that members from a distance do not care to waste time and money by attending them.

It is an unquestionable necessity that *new life* must either be inspired in some way, or that the really active and earnest members of the profession branch off and form a new and more ultra-progressive association, where something can be and shall be done to demonstrate to the public that there is not only earnestness but knowledge, other than mere practical empiricism, among the men filling the ranks of the veterinary profession in the United States.

In other countries the men occupying the positions as teachers at the school make themselves known above and among their colleagues by the reading, discussion and publication of learned and progressive papers.

Those men occupying similar positions in this country have thus distinguished themselves in exactly the opposite way. With the exception of Drs. Liautard and McEachron, it is years since we have seen any publication from them, and from those at Harvard and Philadelphia we have yet to see the first indication that, notwithstanding the many advantages for material which their positions give them, they are in any way fitted for the positions they occupy, or that they possess any educational or intellectual abilities above the rank and file of the profession.

This is not right; when men assume such public and responsible positions, or honored by appointments which would tend to make the people think that they possess abilities superior to us common drones, they are in duty bound to show it, or else they are false to their obligations both to those that appoint them and the public. They do not deserve the honor that has been conferred upon them.

The profession has as much right to look upon such men as its teachers, by means of published writings, as the students have for their daily instruction.

The trouble is, that neither those making the appointments, nor those men that have been honored by receiving them, do not seem to have any idea of the true relation of the veterinary teacher in a school of medicine devoted to those subjects.

Such men should be obliged to give their whole time and entire energies to study, experiment and instruction.

They should be absolutely forbidden from taking any practice outside of the school hospital; or from visiting any patient except as a consulting physician, and at the request of an outside practitioner. If such men have not that professional enthusiasm which would enable them to devote their lives to their country's service for a simple living; if such schools have not the funds that should enable them to pay such remuneration, then the latter have neither right nor cause to exist, and the former should never accept such positions; for they have no professional right to take monetary advantages offered by the positions over less favored members of the profession. B.

CASE DEPARTMENT.

I.—AUTOPSIES AT CENTRAL PARK MENAGERIE.

Tiger (*Felis tigris.*) *Hab. India.*—Æt. 10. The tiger had been in labor fifty-eight hours. Two young ones had been delivered by manual extraction with difficulty, the bony pelvis being too much contracted for a normal labor. Both of these young ones were born dead. The membranes had not come away, nor the placentæ. Four hours after the extraction of the second young one the animal showed signs of exhaustion, and died at 10 P.M.

Autopsy ten hours after death.

The body was well nourished, not fat; rigor mortis moderate. The abdomen was much distended. There was some external hæmorrhage from the vulva.

On opening the abdomen a large amount of gas escaped, allowing the wall to collapse. As the opening was enlarged a considerable amount of blood, which was lying free in the abdominal cavity, escaped. The amount could not be measured, but was at least four quarts.

The liver, spleen, stomach and intestines appeared to be normal.

The kidneys were not examined. The uterus was about twenty inches in length, its wall was thin and relaxed, and the organ was evidently distended by a fœtus. At its upper portion, on the right side of the fundus, just ventral of the entrance of the fallopian tube, a small rupture of the wall was found, from which blood could be pressed out, and through which one paw of the fœtus protruded. It was evident that the source of the hemorrhage into the abdomen had been the ruptured arteries. The uterus contained one fœtus in its membranes, partly decomposed, the placentæ of the two which had been born, and considerable amount of fœtal blood. Its inner wall was black, soft and fetid. There was no peritonitis.

The bony pelvis was not dissected out, but the inability to introduce more than two fingers of the hand through it indicated the existence of a contraction.

Lungs entirely collapsed, crepitated on pressure, and on cutting contained very little blood; no œdema. They were deeply pigmented. There was no consolidation, and no tubercles. No adhesions between the pleural surfaces.

Heart firm—contracted in systole; ventricles empty. No pericarditis. Brain normal.

M. ALLEN STARR, M.D., Ph. D.

Cause of Death in Parrots.—On two occasions we have had an opportunity of examining large Ara parrots found dead in the aviary, without being able to discover the cause of death. In the first of these cases, the bird had suddenly fallen from its perch. The viscera were healthy, the gizzard pale and empty, and the only morbid condition found was a congestive suffusion of the fascia and other tissues of the neck, and a normal softness of the cerebral tissue, with congestion of the cervical and cerebral medulla. All the appearances may be due to mortuary causes of very different origin. It is not improbable that some circulatory trouble may be at the bottom however. The parrot has—so-to-speak—an overgrown head, and this contains an enormous brain, requiring a large proportion of the blood in the body tor its nourishment. The neck, however, is thin. the carotids of small calibre, and consequently the heart is compelled to work under some disadvantage, in order to overcome the combined factors of length and narrowness ot the blood-conduits. The large cerebral vein which runs in the dorsal sulcus of each hemisphere was, in both of the mentioned cases, found filled with a firm black coagulum.

In connection with this fact, we desire to call attention to the generally unsatisfactory state of bird pathology, which is due, no doubt, to special difficulties in the way of impalpable lesions. Thus while the reporter was home, alone one afternoon, a pigeon flew in through the window, and alighted on the top of a door which was fully open, and remained here three hours, and was undisturbed, in order that it might accommodate itself to the location and become a pet for the little boy. Food was scattered for it, which it did not touch; but aside from the fact—which was singular enough—that it had flown into a strange house, without seeming to be aware of it, nothing unusual was noted, Suddenly the reporter was startled by a noise, and the animal was found on the ground in a fluttering fit; from this it recovered, for a few minutes, but was noticed to twist its head around to the right, and to flutter in a circle. It then had a violent epileptiform convulsion, and this continuing with unremitting severity, its neck was wrung to end its misery. Nothing abnormal was found, except that when the brain was removed a circular area on the right hemisphere appeared to sink in a litle, and showed a slightly softer consistency than the remainder, so that agitating it under a gentle stream of water, this part dissolved and came away. ⁂

American Crow (*Corvus Americanus*)—received, September 14th. All the viscera structurally healthy. Some coagulated blood occluded the nasal orifices, and the head and neck feathers were found matted together by smaller coagula and serum. A punctured wound was found, two lines to the right of the median line, on the most prominent part of the cranial convexity. This wound was cleanly cut and triangular; a corresponding aperture extended through the bone. On cutting through the cranium, to expose the brain, the cancellated tissue, which normally is of a pure white color, and empty, was found filled with blood. A slight coagulum extended over the cerebellum and the right cerebral Dura. The latter was lacerated at the posterior declivity, in a longitudinal rent, and the corresponding portion of the cerebrum was clearly cut in the same downward direction. The wounded part of the brain exhibited eversion of the edges (inflammatory swelling) and softening The entire convexity of the right hemisphere exhibited beautifully marked lesions. There were eight oval black spots in a group, from the size of a pin's stem to a pin's head, near the sagittal vascular enleus; a group of three similar and smaller spots was found further forward in the same line. Interspersed with these dark spots, which were blood coagula, there were smaller red dots, and towards the lateral part of the hemisphere these merged into an intensely injected area. The rest of the brain was unusually pale, that is anæmic, even the great cerebral vein being empty.

Anatomico-pathological diagnosis: *Vulnus ceribri*, complicated by ceribritis, filling of the cranial air spaces with blood—consequent asphyxia.

The interesting feature of the case is the demonstration of the effect of violent blows on the bird's brain, namely, the production of numerous minute capillary hemorrhages, *both from the arterial and venous capillaries.* These hemorrhages were none of them on the surface, but imbedded immediately beneath it, in the cerebral tissue proper. The violence of the concussion to which the animal was subjected was shown by the fact that the cranio-mandibular suture was loosened. ⁂

II.—LACERATION OF THE FLEXOR METATARSI.

(SUBCUTANEOUS.)

BY L. V. PLAGEMAN, M.R.C.V.S., BROOKLYN, N. Y.

On the 14th of March a bay gelding, about 9 years old, owned by an expressman, was brought to my infirmary, with symptoms resembling laminitis, as as far as action was concerned, but on closer examination and manipulation I diagnosed rheumatism, and treated accordingly (antiphlogistic). After a few days he became so lame in the off fore-leg that his owner thought he had fractured or dislocated it. Continued to treat him; gave salicylic acid and colchicum; in less than a week the lameness shifted to near fore-leg, and soon after to near hind one. After a few days more, probably a month, or less, from the first attack, the off hind-leg was the one where it rested. In about five weeks he was apparently sound, but I advised his owner not to use him; however, he did, and drove well for over a week; then, one day, he suddenly got lame in off hind-leg again, and on visiting him found a subcutaneous laceration of the flexor metatarsi—as I diagnosed it.

Proceedings Veterinary Medical Societies.

N. Y. STATE ACADEMY OF VETERINARY SCIENCE AND COMPARATIVE PATHOLOGY.

The first meeting of this season (after summer vacation) was held at Association Hall, West New Brighton, Staten Island, on Sept. 11, 1885.

The afternoon session was opened by the President, H. E. Earl, M.D.V.S., Chas. A. Meyer, D.V.S., Recording Secretary. The following members answered roll call: Drs. Hamil, Peters, Plageman, Hepburn, Reilly, Middleton, Juhl, Lindsay, Uibel, Sutcliff, Freeman, Schmidt and Rhors. Regrets were received from Drs. Conklin, McLaughlin, Dancer, Robertson, Laidlaw and Gill. Regrets were also received from friends of the Academy—Hon. George William Curtis, Erastus Brooks and Ernest A. Congdon, Recording Secretary of the Natural Science Association.

The preliminary business was to finish up the work of the June meeting by the appointment of a committee, with full power, to investigate the pathology of glanders. The instructions to this committee were to use all reasonable means in their power for this end, and to work both *separately* and *jointly* in their researches for the benefit of the Academy, the profession, and the public at large, and to report from time to time the results of their work.

Dr. Blumenthal, of Connecticut, gave his views of the difficulty of diagnosing glanders in its incipient stage.

The following were elected members of the Academy: A. E. Bannister, M.R.C.V.S., Alberta, Canada; Richard Ebbitt, M.R.C.V.S., Albany, N. Y.; Philip Brady, S.P.C.A., Clifton, S. I.

Dr. Meyer read a paper on "Mammitis in the Cow."

Dr. Middleton wished to know what was the best preventitive for this particular disease. The opinion of the Academy was that previous to parturition in cows overdue, milking the animal would be the best and safest preventitive.

Dr. Hamill asked that as mammitis was a form of erysipelas, and that the mineral terms were successful in the case, why would they not be useful in the horse, as it was a common affection or disease of the extremities of the horse during winter in New York.

As this was an original and useful subject, the Academy agreed to leave it open for further discussion at a future meeting.

Dr. Plageman then read the following paper on "Colic; its causes, complication, results and treatment":

I shall describe three forms of colic, viz.: spasmodic, flatulent and stercoral, all of which are more or less due to a spasm or contraction of the muscular coats of the intestines, and chiefly the colon; hence its name.

Spasmodic colic arises from various causes, generally from an animal partaking too freely of cold water or food when heated from physical exertion;

from indisposition, constipation, the existence of worms, tumors, calculi, or intersusception, and from the application of cold or wet to the abdomen or legs; displacement of the cæcum, or large colon, or strangulation of the small colon, or laceration of any portion of the intestines are of frequent occurrence.

Flatulent colic is chiefly induced by a fermentation of food caused by special articles of diet, such as green clover or corn, green vegetables or fruit, if raw. Indian meal, or any element that is likely to become acid, or is already so, which produces an accumulation of gas in the intestines, and is frequently voided per anus and occasionally through the mouth.

Crib biting and wind sucking are predisposing causes, and sharp or uneven molars will cause the animal to swallow the food unmasticated, and producing tympanites.

The symptoms of spasmodic and flatulent colic are nearly similar, though there are distinguishing features. In the former, the patient is often more violent, pawing considerably, kicking at the abdomen, lying and rolling, and suddenly rising; pulse full and quick during the spasms, and breathing accelerated; sweats profusely; looks around at the side, and then there are intervals of perfect quiet.

In flatulent colic there is more or less distension of the abdomen and the pain more persistent; pulse apt to be feeble and quick, with increased respiration—the latter due to inordinate pressure on the diaphragm; hangs the head; the extremities are often cold, with cold sweats of the body; the two latter being very unfavorable signs.

In aggravated cases, where the distension is intense, the patient, if not speedily relieved, will die, either of asphyxia or rupture.

Stercoral colic, or impactment, known also as constipation, is caused by an accumulation of fæces, and is occasionally accompanied with tympanites. In all cases of constipation the patient will assume a position as if about to urinate, standing with all four legs stretched from under the body, and the veterinarian is often informed by the attendant that stoppage of water is the ailment. This peculiar position, I claim, is due to pressure by the obstruction or distension on the bladder.

I am of opinion that constipation is as likely to produce colic, as colic is to produce constipation.

Colicky pains frequently accompany special diseases or operations; for instance, purpura, tetanus, influenza, laminitis, suppuration cellulites, the operation of castration. Then there is colic induced by poisons or other irritants.

Therefore, I maintain that, according to the cause, so should the patient be treated. Yet it is a common thing for any one who has ever handled a a horse, whether he has groomed or driven him, or in the slightest degree had anything to do with a horse, to have some favorite remedy for colic. Many such nostrums, we are all aware, positively destroy life; then the violent exercise that the poor animal is subjected to by running or trotting him when suffering acute pain, with a view to expel gas or facillitate the peristaltic action, frequently kills the helpless creature.

Then when you ask such a person, would you have recourse to similar treatment if similarly affected? He would reply: No! I am not a horse. Certainly not; but I should judge he is of the species not far off.

In Stercoral colic the animal will lie for a considerable length of time, or stand, seldom rolls; pulse and respiration scarcely disturbed, except when the spasms occur; patient refuses to drink; mouth and tongue hot and dry; absence of intestinal murmur on auscultation; frequently a disposition to back up against some foreign object; resists enema, which are uncolored when ejected; sometimes sits on the haunches like a dog, which is not to be viewed as a favorable sign.

Should there be intersusception or rupture, calculi or tumor in the two former, death will invariably terminate the case, whilst in the latter two, the attacks may be more frequent, and the patient may survive many before he eventually succumbs.

Whilst I have briefly alluded to the different causes and symptoms of colic and its complications, I will say a few words on the distinguishing symptoms of enteritis, which is frequently associated with, and in which colic or constipation may terminate.

In enteritis the pain is continuous, visible mucous membrane injected, frequent sighing, increased respiration, cold sweats, cold extremities, mouth clammy, pulse wiry and quick, and feeble or strong, according to age, condition, temperament, etc.

Anxious expression and a dejected appearance in the last stages, pupils dilated, pulse imperceptible and a death tremor is quite apparent. In nearly all cases of colic relief is obtained by friction; there is an absence of fever, and quiet during a relaxation of the spasm.

I will not attempt to name the different nostrums that are chiefly resorted to, for they are probably familiar to you all, but I will mention that for over sixteen years I have used nothing else but the anodyne known as hydrate of chloral.

I believe it was first generally used about the year 1869; but it was discovered by Liebig nearly forty years ago. The doses I administered are from ʒii. to ʒiv. either in ball or in aquous solution. I know of many practitioners who give considerable more, and criticise my small doses, but I would advise any one who has never tried the small dose to do so. Camphor is another anodyne, which calms nervous irritation, and is diaphoretic. I occasionally combine the two, as they easily unite and form a syrup. The doses of the latter in combination is from ʒi. to ʒii. When there is much flatulency, ammonia is an admirable antacid to combine with chloral. I seldom have to administer a second dose, and if the patient is constipated I never administer a cathartic until the spasms are relieved; then I give an alortic cathartic, of from ʒv. to ʒviiii. of aloes, according to the size, age, breed and condition of the patient.

Looseness, or apparent diarrhœa, is often a percursor of constipation. Then I attribute it to indigestion. Even here a cathartic is necessary, but the dose should be modified.

Constipation may continue for as many as six or seven days, and during that time pain is present to a greater or lesser degree; then the remedy to relax spasm or relieve pain should be altered. For instance, I having given chloral in the first instance, might repeat the dose. but do not venture on a third. I change to ext. belladonna, opium or morphine, and do not follow up too closely. I would rather depend on hot fomentations to the abdomen and frequent enemas of plain warm water, and though the enemas do not reach further than the rectum, it acts as a sedative, and certainly does no harm.

After the first cathartic has been given, it is necessary to wait for at least thirty hours before a second dose should be given. I find that a combined purgative acts better in some cases. Then I give raw linseed oil or castor oil, and if the constipation is obstinate, and there is no symptoms of enteritis, I add a few drops of croton oil, say ten to twenty gtt. The patient seldom drinks and as liquids are inserted I drench with warm water.

Puncturing the intestines in tympanitis is a perfectly safe operation, and I have frequently given relief by so operating; but it is useless to puncture when the animal is in a dying condition, though I have punctured when it was impossible to administer the medecine, and afforded such instant relief that with other external and internal treatment following, I have saved the patient.

Tobacco smoke enemas I have often resorted to in many obstinate cases of constipation with beneficial results, acting as a narcotic, relaxing spasm, then slightly stimulating the mucous coat, it having the power of reaching where fluids cannot.

A member asked for information in regard to pleuro-pneumonia contagion in the vicinity of New York, especially Suffolk and Richmond Counties, where it was especially reported to exist.

Dr. Lindsay claimed that in his district he did not know of any cases, and was happy to state so for the benefit of his patrons.

Dr. Earl reported that it was in existence to a very limited extent in Richmond County, and could be easily stamped out by the proper precautions and inoculation.

Dr. Meyer claimed that in the city of New York it was in existence, and that it was likely to remain so under the present "sanitary laws."

J. F. Reilly, M.D., then read a paper on the physiological character of the alimentary tract.

MASSACHUSETTS VETERINARY ASSOCIATION.

The regular meeting was held at 19 Boylston Place, Boston, Wednesday evening, June 3d.

In the absence of the President, Vice-President J. S. Saunders presided, and there were present thirteen members, viz: Drs. Alderman, Blackwood, Bryden, Bunker, Harrison, Howard, Osgood, J. S. Saunders, F. Saunders, Simmons, Skally, Winchester and Winslow.

Inquiry being made as to progress of Committee on Charter, they reported that owing to the close of session of the Legislature no progress could be made at present.

Some discussion taking place as to the legal points of the subject, Dr. Osgood moved that the committe be authorized to consult a lawyer, and Dr. Winchester was accordingly authorized to gain legal information, he having already approached Attorney-General Sherman in regard to the matter.

The committee appointed at the May meeting, to prepare resolutions censuring the pursuance of the so-called "subscription plan" by veterinary institutions, reported the following:

"WHEREAS, we, the Massachusetts Veterinary Association, a body composed of regularly graduated veterinarians, having for its objects the elevation and advancement of the veterinary profession and the science of veterinary medicine, and the encouragement of collegiate and professional feelings among the members of the profession practicing in the State of Massachusetts; and

"WHEREAS, we believe such objects are to be obtained only by each member of the profession as an individual, and each organization as a body, using its every effort to that end, commending and applauding whatever advances and honors the cause, and discouraging and condemning that which dishonors it and retards its progress; and

"WHEREAS, a system of business management pursued by different veterinary institutions in this country and England, and known as the 'subscription plan,' has, in the experience of our *confréres*, been derogatory and detrimental to the best interests of the science and profession; and

"WHEREAS, we, the members of the Massachusetts Veterinary Association, have realized by our own experience that the said 'subscription plan,' as pursued by the management of the Harvard Veterinary Hospital in this city and State, is *repeating* its disgraceful history, in exerting a most injurious influence upon members of the profession practising in the State of Massachusetts, is already threatening defeat to the objects of our Association, and is thereby a foe to the cause of veterinary science and the veterinary profession; be it therefore

"*Resolved*, that we, the members of the Massachusetts Veterinary Association, in meeting assembled, do hereby, as a body, express our disapproval and condemnation of the adoption and continued pursuance by the management of the Harvard Veterinary Hospital of the said 'subscription plan;' and be it

Resolved, that it is the duty of every member of this Association to use his utmost influence to have said plan discontinued and abolished."

J. S. SAUNDERS, D.V.S.,
MADISON BUNKER, D.V.S., } *Committee.*
L. H. HOWARD, D.V.S.,

Following the reading of the above report quite a lengthy discussion of the question took place, which called forth a very general expression of opinion.

It was finally voted to accept the report, by a nearly unanimous vote.

Dr. Bryden presented the name of Charles M. Bailey, V.S., of Haverhill, as an applicant for membership, which was referred to the Executive Committee.

Dr. H. L. Alderman read a paper on "Laminitis in the Horse."

He first remarked that the disease was not confined to the feet, but that the whole organism was affected, and advised that in diseases of the lungs, in heavy horses particularly, the feet to be poulticed to prevent metastatic laminitis.

The essayist gave a very clear description of the course of laminitis, and the different forms of treatment, and the paper was provocative of a good discussion as to causes operating to produce laminitis, different modes of treating it, including various ways of shoeing, to afford relief, etc.

At its conclusion a unanimous vote of thanks was tendered the essayist.

No other business coming before the meeting, it was adjourned.

L. H. HOWARD, Secretary.

The regular monthly meeting of the Massachusetts Veterinary Association was held in Boston, Wednesday evening, July 1st.

Dr. Billings presided, and there were also present Drs. Blackwood, Bryden, Byrne, Howard, Peters, J. S. Saunders, Skally, Winchester and Winslow.

The first part of the evening was taken up by a discussion in regard to the duties of the Executive Committee, and a report of progress by the committee on Charter.

The meeting then listened to Part I. of an essay on "The Horse's Foot," by Dr. Bryden, the essayist promising to carry out his original intention of a further treatment of this subject.

He first called attention to the importance of study as to conditions of the horse's foot, even from the time of its first formation during fœtal life, as well as the conditions affecting its growth afterward, such as locality, climate, soil, etc.

He said, we have different varieties of hoof, according to the locality in which the horse is raised, and according to what its surroundings are.

He called attention to the necessity of guarding against the changes which domestication produces, and explained how an irregularly growing hoof would cause distortion and unsymmetrical development of all tissues above, producing spavins, ringbones, bent hocks, dimpled hips, tail drawn to one side, etc, thus affecting not only the action, but shape as well, of the animal.

At the conclusion of his remarks a vote of thanks was tendered the essayist, and he was asked to favor us at a later day with his further treatment of the subject.

Dr. Peters was appointed essayist for the September meeting, and the company adjourned.

L. H. Howard, Secretary.

VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY.

The fifth regular meeting of the Veterinary Association of New Jersey was held at Van Woert's Hotel, Long Branch, August 6th, 1885.

The President, Dr. Miller, called the meeting to order at 1.30 P.M., and requested the Secretary to call the roll. The following members were in attendance: Drs. H. W. Rowland, of Jersey City; Wm. B. E. Miller, of Camden; C. K. Dyer, of Mount Holly; James W. Hawk, of Newark; W. P. Humphreys, of Elizabeth; Wm. B. Haydon, of Newark; J. C. Dustan, of Morristown; J. Gerth, Jr., of Newark; and Wm. Herbert Lowe, of Paterson.

The minutes of the last meeting were read and approved.

Dr. W. H. Purdy, Secretary of the New York State Veterinary Society, was present. Dr. W. Runge, of Newark, was also present as a visitor. The secretary received a letter from Prof. Liautard, Dean of the American Veterinary College, expressing his desire and intention to be present at the meeting; but his absence was accounted for by the pressure of duties which necessarily demanded his time on his return from his recent sojourn in Europe. A telegram was received from Dr. Chas. T. Goentner, Secretary of the Keystone Veterinary Medical Association, expressing his inability to attend.

According to Senator Fish's advice and instructions, the Certificate of Incorporation had been duly recorded at Trenton. Therefore, the Veterinary Medical Association of New Jersey has become legally incorporated.

The chair requested the committee upon the Constitution and By-Laws to report. Dr. Lowe, on behalf of the committee, stated that the new Constitution and By-Laws were in course of preparation, but as Dr. Gerth had been traveling in the West, it had been impossible for them to meet in time to complete the same.

The reports of the Secretary and Treasurer were received.

Dr. Dustan related, at some length, his experience with rheumatic influenza, stating that twenty-two cases had come under his observation during the present year. Considerable discussion followed Dr. Dustan's statements, which were participated in by many of the members. Dr. Lowe spoke of two cases of so-called rheumatic influenza, and gave some points of differentiation.

Dr. Dyer was the next speaker, the subject being operative surgery, and gave his experience in removing melanotic tumors. Dr. Miller followed on the same subject.

Dr. Rowland, who has been making investigations for the government in Texas relative to contagious diseases, was asked to give an account of his investigations, but declined to do so at the present meeting.

The Secretary offered the following resignation;

"LONG BRANCH, N. J.,
August 6th, 1885.

To the Veterinary Medical Association of New Jersey.

GENTLEMEN—The undersigned, your secretary, most respectfully tenders his resignation as Secretary of the Veterinary Medical Association of New Jersey. This resignation is a necessity, owing to the fact that I leave New Jersey permanently to make a new home in the State of Nebraska. I exceedingly regret taking this step, but assure your honorable body that my association with your society will always be remembered with pleasure and pride.

Yours most truly,
J. GERTH, Jr."

The resination was accepted. The President, Dr. Miller, said that next in order would be the election of a Secretary. Dr. Lowe was nominated and elected unanimously.

The following resolutions were offered by the President:

"WHEREAS, our Secretary, Dr. Julius Gerth, Jr., has recently been appointed State Veterinary Surgeon of Nebraska, and, consequently, is obliged to leave us; therefore, be it

"*Resolved*, that we express our sorrow at the loss of so valuable a member of this Association, but at the same time we congratulate ourselves upon the appointment of one of our members to so responsible a position in a far-distant State, and we feel assured that the authorities of the State of Nebraska will have no cause to regret their choice;

"*Resolved*, that we tender to our esteemed friend our hearty congratulations, and hope his appointment may prove equally beneficial to both the State and the appointee;

"*Resolved*, that we express the hope that the health of our friend may be preserved to a long life of usefulness and influence in his future field of operations."

Dr. Gerth's response, upon the adoption of the resolutions, was characterized by marked appreciation of the esteem in which he was held by his brother members of the Association, and he then offered his resignation as a member of the Society. The same was accepted, and he was immediately and unanimously elected an Honorary Member.

The Secretary was instructed to forward a copy of the foregoing resolutions to his Excellency, Hon. James W. Dawes, Governor of Nebraska.

It was decided to hold the next regular meeting in Camden, the second Thursday in December.

Wm. Herbert Lowe, D.V.S., Secretary.

CORRESPONDENCE.

To the Editors of the Journal of Comparative Medicine and Surgery:

Gentlemen—In the April number I started the degree ball, and yet it rolls. I hope it will not be allowed to stop until it is decided which is the best degree, and all schools have adopted it.

In the July number is an excellent article upon this subject, and I agreed almost entirely with the writer until I reached the last two lines, and I object to only four words in these two lines. He writes as follows: "There should be a convention of delegates from all these schools, and one title—Doctor of Veterinary Medicine—adopted by all."

If he had written "one title—Veterinary Surgeon—adopted by all," the ideas in the article would have been so nearly like my own that I could have imagined that I was the author of the article.

I object to D.V.S. or D.V.M. "B" writes: "The title one has is simply the announcement to the public that one is capable of offering it the services of an educated professional. The more we complicate this title by adding on a whole alphabet of letters, which are entirely meaningless to the public, the more we detract from the dignified position that we should assume."

Does not D.V.M. complicate this title? The public know us as Veterinary Surgeons ; the public know what V.S. means.

How many people in America know what D.V.M. means? Not one in ten—perhaps, fifty—thousand. If we adopt D.V.M. we must teach the public that V.S. does not mean Veterinary Surgeon, and that D.V.M. does mean Veterinary Surgeon. This will take at least fifty years, and if even then the public see any reason for the change they will see more than I can now. "B" writes: "How many Americans know what F.R.C.V.S. means?" Many more than know what D.V.M. means. The writer wishes a short title with few letters; yet he throws aside V.S. for D.V.M.

Let us throw aside the "Doctor." There is no honor in it; every quack, vender of patent medicines, every blacksmith who has ever given a drench, every medium is called "Doctor." I have long since thought it a disgrace than an honor. The D.V.M is a "horse doctor," and he cannot deny it, but the V.S. can say "I am *not* a 'horse doctor;' I *am* a veterinary surgeon."

We read in the above-mentioned article as follows: "It would seem as if many of the younger men in the profession had gone mad in their desire to hide their regular calling under the more resonant title of 'Medical Doctor.'" Is this not almost exactly what "B" advocates? Does he not ask that all schools confer the degree of (Veterinary) Medical Doctor?

I do not wish to give the impression that my object is to criticize this article, for I am much pleased with it. I only wish to convince the writer and others, that V.S. is a more appropriate title than D.V.M.

"B" writes, in speaking of veterinarians using M.D., "it required no such addition to his name to enable Bouley to become President of the Society of France. Gerlach, Leisering, Roell, Toussaient, Chauvaeux, and others needed no M.D. to lift them into the heaven of mortals."

Did they need a D.V.M.? Were they not simply Veterinary Surgeons?

Why is it not just as well for the schools to certify that one is a Veterinary Surgeon as to proclaim that one is a Doctor of Veterinary Medicine? V.S. is simple, well known, practical, terse; D.V.M. is ponderous, pretentious, unknown to the public, uselessly long (four words, instead of two), and it is meaningless to the public.

D.V.M. was first conferred by Cornell University, and only after six years of hard study, and now it is conferred by Harvard, and Iowa Agricultural College upon the completion of only three years of study.

One-half its value taken off at a stroke. It will soon be given upon the completion of two six months courses. In fact, this apparently is what "B" is working for, as he wishes all schools to adopt it.

But "B" and I are working [for the same thing; that is, one degree instead of half a dozen, and that one the most simple, practical and expressive.

Hanson, Mass. **Flavel S. Thomas, V.S.**

OBITUARY.

DR. AUGUSTE ZUNDEL.

Dr. Auguste Zundel, the superior veterinarian of Alsace-Lorraine, died at Strasburg on June 11th. The doctor had a world-wide reputation by his numerous scientific writings in the various journals, but more particularly by his edition of De Arbeval's "Dictionaire de Medicines, de Chirurgie, et d'Hygiene Vétérinaires." He was a most indefatigable worker, and his services were not only recognized by the several veterinary societies, but by the ruling powers of several countries.

E. W. Perry, V.S., M.D., died of apoplexia July 27, at New Bedford, Mass., where he was in practice. Dr. Perry was a graduate of Harvard Medical School, as well as of the Royal Veterinary College, London.

REVIEWS.

Lehrbuch der Speciellen Pathologie und Therapie fur Thierarzte. A text-book of Special Pathology and Therapeutics for Veterinarians. By William Dieckerhoff, Professor of Special Pathology and Conductor of the Clinic for Larger Animals at the Royal Veterinary School, Berlin.

Another book with the same title is also advertised by Professor Friedberger, of the Munich Veterinary School, and Fröhner, of the School at Stuttgart.

Neither of these works appear in a completed volume, but in parts. We have received advance sheets of the first work only.

For years the veterinary profession of the world has been very much in need of a text-book upon the special pathology of the domestic animals, of which it could be said that both *scientifically* and *practically*, it was on a par with the best of the modern works upon the same subject in human medicine. The clinical side of most of our books, such as Williams and Robertson, is very well written up, but pathologically they are by no means what they should be in the light of modern research and in comparison with existing conditions in human medicine. Pathologically they consist too much of human patho-anatomy transferred to animal conditions entirely regardless of criticism. Even on this point they are antiquated, being founded more upon Rokitansky than the work of the present Cellular Pathological School. Roell's book that has enjoyed much credit in Europe, never deserved it, and with the exception of the veterinary police, is not equal to either of the English works.

We greet these two new books from fresh authors in this field with the hope and confidence that this want will be filled. Both of them are by noted clinicians. The one before us, by Dieckerhoff will certainly not be a disappointment, the pathology of the diseases so far described being replete in fullness and exactness of description.

It will, also, be an original book in many respects, particularly in regard to the nature of many diseases, especially the pulmonary complications of the horse.

With reference to the so-called ''influenza,'' the author has entered upon the much needed task of analyzing the conditions carefully and endeavoring to show that veterinarians have too frequently been inclined to class quite a number of etiologically different diseases under this one name.

Here we shall find his views decidedly original, and whether we at once agree with them or not, are open to the most earnest consideration.

With regard to influenza proper, which he calls the "Brustseuche" (breast plague), or ,'pneumo-pleuritis contagiosa equorum" typical infectious inflammation of the lungs in the horse. He has opened the question to discussion in a very positive manner as to whether the disease is contagious or infectious in its nature. He looks upon it as a "miasmatic contagious disease." While the whole tenor of his writing is for its contagious nature, still he has so much to say about miasma, stable infection, etc., that one is left in doubt to which he attributes the most essential role in its etiology. The idea that it is contagious has been strongly gaining ground in Germany.

We do not accept it at all.

A strictly contagious disease is one in which the original inficiens develope in an animal organism, not outside of it; and only passes from one animal to another, or by means of accidental vehicles. Glanders, the variolæ, rabies. This disease has nothing of that in its nature. Again, we have infections—true malarial diseases, in which the animal must go to a given locality to acquire them—such as fever and ague.

Then we have that somewhat mysterious class of malarial diseases—local in their origin, but in which the animal organism acts as a vehicle through its power of polluting surroundings, but still the diseases are not contagious —cholera, yellow fever, Texas fever, typhoid.

This typhoid-pneumonia of horses most certainly belongs more in this latter class than any other.

That the horse-ail group—strangles, pink-eye, etc., prepares the way for it and frequently exist with it, is a well-known fact. Here we have two distinctly different diseases—two different etiological movements acting upon one and the same organism at the same time.

Changes in the weather causes conditions in horses predisposing them to influenza.

To our mind influenza is a straight miasmatic disease. The ill conditions of stables, manure pits, ventilation, etc., favoring the development of a germ for which the equine organism has some special disposition.

Whether one or more horses in a large stable are attacked by influenza, at approximately the same time, or serially, does not depend upon contagion, but upon the presence of a common cause and outside conditions—usage, exposure and many little things that render such individuals open to infection.

We do not consider these points critically enough. As practitioners we do not often have an opportunity to watch every little indication of indisposition which may act as the artrium for malarial inficientia, which would certainly escape a groom's attention.

Even the fact, quoted by Dieckerhoff, of placing an apparently (?) well horse in a box that had been inhabited by an influenza patient, the disease following is not a convincing proof. We should have the tabulated condition of said "well horse" for a week or more before such a period; should know that the temperature had been normal and even, all this time; that it had never been sluggish or off its feed; that its pulse was and had been regular, and that the mucosæ were normal all the time, before we can accept any such theory. Many horses appear well, work well, yet the next morning, or a few hours, reveals unmistakable indications to the contrary.

We have not made these remarks to be captious, but rather to call attention to one of the strongest places in the book, one which should lead to the most careful study of patients. The above is the result of our own observations, based on the ownership of a large number of horses which we were driving daily, all of which were were kept in a not over clean livery stable in which there were frequent cases of influenza. The next diversion of the author is the description of what he calls "ephemeral pneumonia."

We cannot come to any clear idea of an abortive form of pneumonia, resembling that of influenza in its earliest phenomena, but disappearing in a few days, always ending in recovery, if there is really solidification of any part of the lungs present. The author says "According to my examination the local affection is a serous pneumonia of circumscribed character. The local symptoms, as well as the fever, generally continue every twelve or twenty-four hours; on the next day no signs of disease can be discovered." What a serous pneumonia is, we fail to understand. Such a condition, according to our ideas, would be œdema pulmonum. In fact, we cannot see that the author describes anything more than local congestion, with some dullness of the vesicular respiration. No pneumonia ever closed up in twelve to twenty-four hours from its initiation, that he or any one else ever saw. As no autopsy has ever been made by him of these patients, we beg leave to doubt his conclusions.

It is singular that in this part, which we conclude ends the pulmonary diseases of the horse, that no reference should be made to the ordinary simple, or sporadic pneumonia, which, while frequently characterized by extreme solidification of one lung, rarely extends to both; is never accompanied by gangrenous necrosis, as is the case in influenza, where the fever is never extreme at all in the first few days, when the animal retains, except at this period, a fair appetite; the heart is not much affected in its musculation; where there are seldom, if any, typhoid depression symptoms present; complications are seldom, and recovery generally certain in healthy animals, with nothing but good nursing. There is nothing contagious or malarial infectious about it, but generally follows careless exposure to drafts after work.

This part closes with an exhaustive treatment of the horse-ail—pink-eye, strangle—question. The chapters on anthrax and glanders leave little, if anything, to be desired. What should be done is this: Some competent person should take this work and our two English works, and from them compile a thoroughly good book for English speaking veterinarians. It should be done with a critical consideration of the subject, and in a thoroughly objective manner.

TRICHINIA SPIRALIS AND TRICHINOSIS, INCLUDING AN EXAMINATION OF INDIANA HOGS. By Thomas B. Redding. Prepared under the direction of the State Board of Health of Indiana.

Much as we welcome every attempt at extending our knowledge upon this and kindred questions, we can but think that enough compilatory work has been done with regard to the history, nationality and symptomatology of trichinosis.

This contribution before us is largely a compilation, and inferior to that published by the Army Medical Service by Glazier, in many respects, particularly in the want of illustrations.

It adds nothing new to our knowledge whatever, with the exception of confirming previous reports of the percentage of trichinosis in American hogs: the author having examined 550 hogs—all from Indiana—and found twenty-five of them trichinous—4½ per cent. "The highest percentage of infected hogs were those of the retail butcher shops." We would not be captious, but really cannot see the use, and can readily see the injustice and possible horror. of publishing the names of packing-houses that furnished material. Nor, in criticising this report, would we have it supposed we are seeking cause to find fault with the author.

The point is this. If the hogs of any given State are to be examined, it is not only unjust, but useless to examine a few from one large packing-house or another. That American pork is more highly trichinous than German, is altogether well known at present. What we want to know is: Why is this so?

We must enter upon a critical study of the conditions under which all the hogs in a given State are raised, housed and fattened. We must then examine every hog killed in the State according to their different classes. We shall then know what manner of raising hogs contributes mostly to trichinosis. We shall then, and only then, be able to concentrate our work in a given direction after the cause.

Rats are no more the cause of porcine trichinosis than cats are.

An accidental cause—a dead or sick rat may occasionally be, but the the cause, never. One great failure with our author is that he does not seem to have given any practical study to the subject, with the exception of his few examinations. He makes no attempt to find out how the hogs were raised or where they came from. He does not enter into any critical consideration of the work of others, or consider many of the absurd ideas published in the majority of our government reports, some of which are absolute lies—politically they have another name for this vice.

Still, we welcome even so small a contribution gladly. It is only by piling up the facts that we can eventually hope to make any impression upon the petrified brains of American legislators.

Having begun. we hope the author will extend his labors in the direction of original research, as we have pointed out, instead of extending his work in a larger monograph, for which there is no necessity.

We must warn any one against the idea liable to be gained from reading the article on "Methods, Instruments, etc."

To examine pork for trichinosis is about the easiest thing one can imagine. It does not require any compressors, double knives, etc, simply a pair of curved scissors, two good object glasses, and a microscope with a power of 75 diameters Cut a moderately thin section lengthwise of the muscle with the scissors, put it between your object glasses, press upon them with a rolling motion until the object is transparent, experience will soon show how much, and examine. Soiled and smoked articles require the least soaking of the section in warm water before mounting, simply to soften it. When one is going to enter upon myphological or biological questions, the matter assumes quite another form.

To conclude, we have then a sufficient knowledge o the literature and past history of trichina spiralis. What we need to know now is more biology. Where does the creature come from, and what forms or modes of life has it before the hog swallows it? These given, we can prevent it.

QUARTERLY BULLETIN OF THE CLINICAL SOCIETY OF THE NEW YORK POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL. New York: 1885.

We have received the first number of the first volume of a periodical with the above title.

The subject matter, which runs over a hundred pages, is of a high scientific character. Moreover, and this is of more importance, its contents are of much practical value, contributed by experienced physicians, and based on clinical observation.

The article on "Pthisis in relation to Syphilis," by Dr. Porter, is finely illustrated. The price is within the reach of all, $2.00 a year; single numbers being only fifty cents. To be obtained at No. 226 E. Twentieth street.

BOOKS AND PAMPHLETS RECEIVED.

STUDIES FROM THE BIOLOGICAL LABORATORY, JOHNS HOPKINS UNIVERSITY. Vol. III., No. 3.

CONSTITUTIONAL TREATMENT OF CARIES AND NECROSIS. By Hal. C. Wyman, M.D. Detroit.

UNIVERSITY OF PENNSYLVANIA, Catalogue and Announcement, 1884–5, Department of Biology. Philadelphia.

UNIVERSITY OF MICHIGAN. Annual Announcement of the Department of Medicine and Surgery, 1885–6. Ann Arbor.

COOPER MEDICAL COLLEGE. Annnal Announcement, 1885. San Francisco.

INDIANA STATE BOARD OF AGRICULTURE. 34th Annual Report. Vol. xxvi. Indianapolis.

SHADOWS ON THE ETHICS OF THE INTERNATIONAL CONGRESS. By Levi Cooper Lane, M.D. San Francisco. 1885.

DUTY OF THE STATE TOWARDS THE MEDICAL PROFESSION. An Address Delivered before the Medical Alumni Association of the University of Michigan, by Conrad George, M.D.

TABULAR STATISTICS OF ONE HUNDRED CASES OF URETHRAL STRICTURE TREATED BY ELECTROLYSIS. By Robert Newman, M.D. New York.

JOHNS HOPKINS UNIVERSITY CIRCULARS.

ANNALS ET BULLETIN DE LA SOCIÉTÉ DE MEDECINE DE GAND.

QUARTERLY COMPENDIUM OF MEDICAL SCIENCE. Philadelphia.

JAHRESBERICHT DER KONIGLICHEN THIERARZENEISCHULE ZU HANNOVER HERAUSGEGEBEN VON DEM LEHRER-COLLEGIUM REDIGIRT VON DEM DIRECTOR MEDICINALRATH, Dr. Dammann. Siebzehnter Bericht, 1884–5.

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